THE MEN BEHIND THE RED AIR FORCE

FLYING

TECHNOLOGY DEPARTMENT

The AIR GUARD GOES TO CAMP

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HOW TO FLY UNDER THE GI BILL

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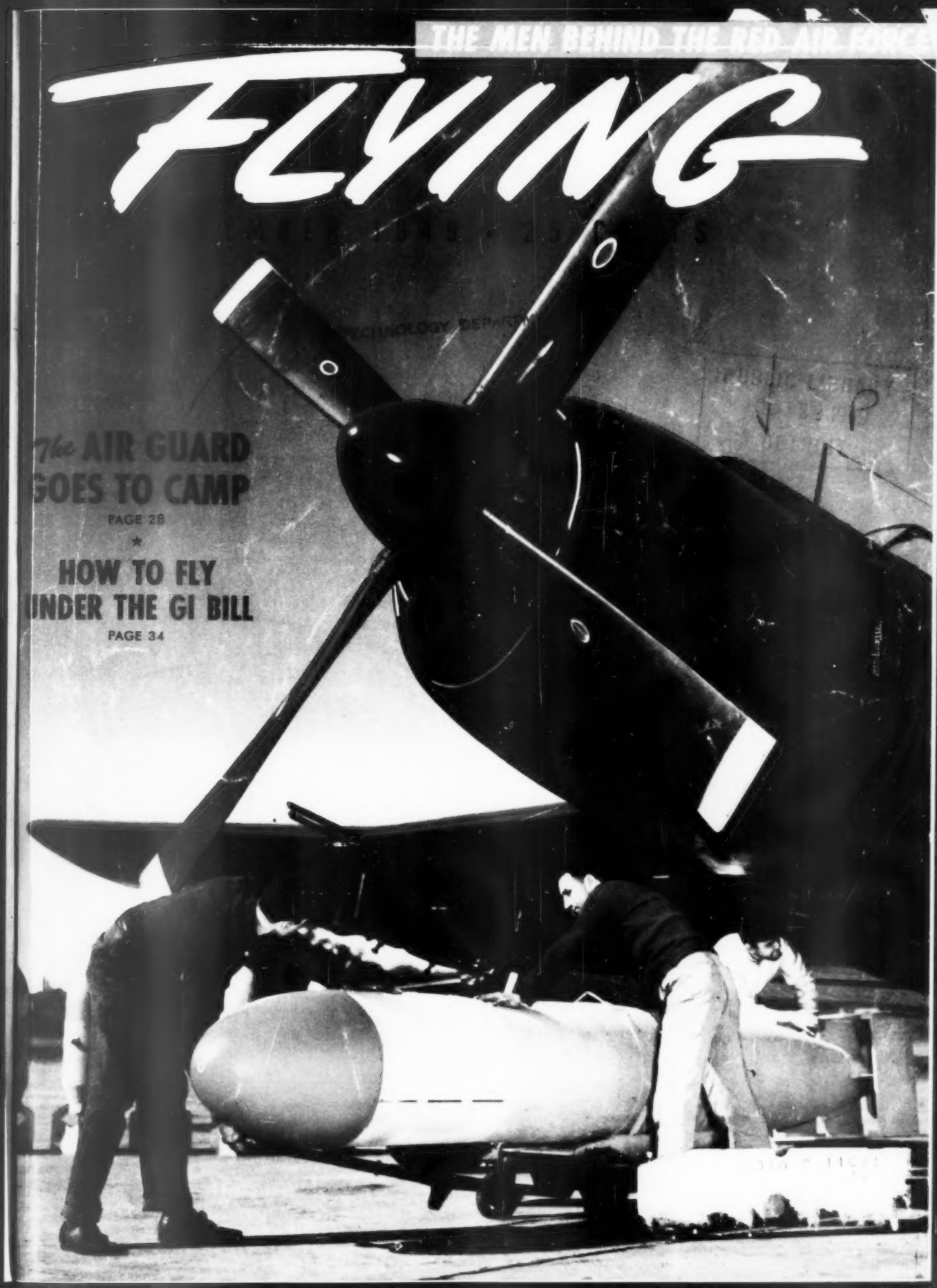

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THE COVER: Crew loads one of three 2,200-pound torpedoes on a Martin Mauler (AM-1).

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FLYING

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WRONG MANUFACTURER?

On page 43 [September FLYING] you show [the first] British jet bomber . . . "the English Electric A-1." English Electric does not make aircraft.

CHARLES S. GIBBED
Ontario, Can.

● If it does not make aircraft, The English Electric Company, Ltd., (Strand Road, Preston, Lancs., England) has hoodwinked the Royal Air Force, which is now testing the high-performing English Electric A-1 (recently redesignated the Canberra B-1.).—Ed.

THE FLYING BANANAS

. . . For the record, I would like to point out that the fifth paragraph of ["The Flying Bananas and How They Grew," July FLYING] is not entirely in accordance with the facts. The author says: ". . . in 1940 no American designer had been able to produce a successful helicopter."

It is generally recognized that Igor Sikorsky and his associates flew the VS-300 helicopter throughout the fall of 1939.

EDWARD M. BENHAM
Supervisor of Advertising and Public Relations
Sikorsky Aircraft
Bridgeport, Conn.

● Says Author Edgar Deigan: "In my article, I said that Sikorsky's helicopter eventually was recognized as the first successful helicopter to be flown by an American designer. [But] I think the crux of the situation can be summed up in the individual interpretation of the word 'success.' I judge from Mr. Benham's letter that the company's attitude is that the 'copter was successful even prior to the press show of May, 1940. How then can one reconcile that feeling with some of the pioneer efforts to gain success in the helicopter field?

"For instance, the Emile Berliner helicopter was capable of the following performance: it attained a height of 30 feet, maneuvered laterally for a distance of 1,200 feet, and flew 40 m.p.h. This was accomplished in 1925. The Debothezat helicopter was tested at Wright Field, then McCook Field, during 1921-1923, being flown by Maj. Thurmond H. Bane. Going back even further, Thomas Perry spent over $2.000 in building a model helicopter and eventually succeeded in 1918 in getting his model to rise under its own power. Certainly these men, too, 'succeeded' in some measure.

"I do not attempt to detract from Sikorsky's very real contribution in the helicopter field. For the purposes of the Piasecki article, I did not believe it necessary to go into the pioneer work, as primarily the story was about the Piasecki's quick and successful career these past few years."—Ed.

ALASKAN OPERATION

The lightplane is really doing a job up here in Alaska. . . . Safeway Airways covers Alaska with all types of air transportation, especially catering to hunting and fishing parties—and no flight is too short or too long. One day last summer I flew over 1,000 miles out on the [Aleutian] "Chain" and the next day was north of the Arctic Circle with a group of vacationing nurses. We also get our share of emergency calls from injured persons and occasionally have to race the stork.

Last month I made 182 different flights and carried over 500 persons. During the Fourth of July weekend, we hauled 125 men to and from the construction jobs between Seward and Anchorage as well as several fishing parties to various lakes.

We have a Grumman *Widgeon* for the long hops and heavy-duty work, a Stinson *Station Wagon*, a Piper *Clipper*, a 90

Cub on wheels for sandbars, a 90 *Cub* on floats for the puddles, a Piper *Vagabond* for the beaches and a *Stinson* L-5 for out-of-the-way stretcher cases.

The *Clipper* [see photo] is used quite extensively in the construction of a Seward-to-Anchorage road. There are several construction camps located along the route and the only means of transportation for getting the men and supplies in and out is by air. There are no fields available, and we land on the highway wherever we can find a suitable place. The *Clipper* is really good for this as the road is none too wide, in some places only a 26-foot grade with trees on both sides.

GENTRY W. SHUSTER
Safeway Airways
Seward, Alaska

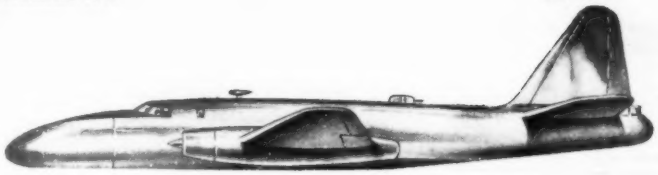
JET CLUB

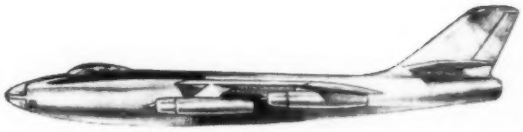
The "Caterpillar Club" was formed for pilots whose lives have been saved by the use of parachutes, and the "Goldfish Club" for pilots saved by dinghies or life jackets [Ed.: FLYING is headquarters of the Goldfish Club's American Division].

Why isn't a similar club formed for pilots whose lives are saved by the automatic ejection seats used in jets?

ART RONNIE
Hollywood, Calif.

(*Continued on page* 60)





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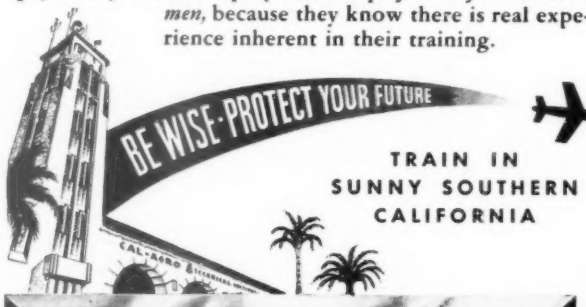

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F-11

The Majestic Constellation

The newest member of the Lockheed Constellation family is the Union of South Africa. This government recently purchased a fleet of these 320-mile-an-hour transports for the South African Airways. Now, four members of the great Commonwealth of Nations fly the majestic Constellation. Australia is represented by Qantas Empire Airways, India by Air India International and the United Kingdom by the British Overseas Airways Corp., all flying the Constellation. Eight other major world airlines also fly, and many have reordered, this famous *tried and proven* airliner, still the world's most reordered four-engined transport.

LOOK TO LOCKHEED FOR LEADERSHIP

Lockheed Constellation

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NOTES ON CIVIL FLYING

. . . **All rumors to the contrary,** the Helioplane will go into production in 1950. The two-place version is shelved but Professors Otto Koppen and Lynn Bollinger will introduce a four-place version. Only a limited number—perhaps 50 to 100—will be built at first to guarantee extensive service-testing. After a year of service-testing, which should be enough to iron out all the craft's bugs, the inventors hope to build a bugless version in quantity in an existing aircraft factory. The two-place Helioplane has been extremely successful and lives up to all the inventors' claims of being stall-proof and spin-proof. The Helioplane will fly under full control at less than 30 m.p.h. and operate out of a 300-foot strip over 50-foot obstacles.

. . . **A modern long-range** super bomber has 290 instruments, whereas a 1918 warplane had only seven instruments.

. . . **The Emigh Trojan,** the simplified construction all-metal low-wing two-placer, will be built at the Douglas Bisbee Airport in Arizona. Harold E. Emigh, designer and president of the Emigh Aircraft Co., has acquired all of the company's assets under license. So far, 31 of the 85-h.p. models have been built to test serviceability. Price of the Trojan 90 is $3,295 FAF, and of the 85, $3,195. Radio, lights and junior jump seat optional at extra cost.

. . . **Airplanes will be flying** 1,500 m.p.h. by 1960, according to the calculated predictions of Harold Luskin, Douglas Aircraft Company aerodynamic research engineer.

. . . **The Hannaford Aircraft Company,** Winnetka, Ill., is building limited numbers of the former Rose Parakeet under the name Hannaford Parakeet. The single-place open cockpit biplane has a span of only 20 feet and lands at about 30 m.p.h. the factory claims. Versions are available with 40-h.p., 65-h.p. and 85-h.p. engines, with FAF prices ranging from $2,200 to $2,345.

. . . **Temco is testing** a proposed 1950 model Swift with a 145-h.p. Continental engine. No decision for putting the plane into production will be made until completion of an extensive test program, TEMCO President Robert McCulloch says. Even under favorable conditions, the plane could not be introduced until 1950 at the earliest. Designated the TE-2A, the craft is an outgrowth of the development of the 145-h.p. TE-1A military-type trainer.

. . . **Associated Aviation Underwriters** has cut insurance costs 10 per cent on "the better grades of risks." The reductions apply to four-place airplanes privately owned or owned by companies for business use. The reduction is not a blanket one but applies to experienced pilots flying Cessnas, Navions, Bellancas, Bonanzas, Stinsons, and other four-placers which are kept at the better airports. Ten per cent deductible is down from $8.65 to $7.75 per $100 on four-placers.

. . . **Today's private pilot,** with some 35 hours of flight training, is equivalent or superior in many respects to the 200-hour commercial pilot of 20 years ago, Dr. Leslie A. Bryan, director of the University of Illinois Institute of Aviation, declared recently.

. . . **Sunshine Air Trails** is the name of an attractive folder published by cities in the tri-state area of Arizona, New Mexico and West Texas. Designed for private pilots, it lists airport data and pictures of scenic attractions in the region. Write El Paso Sunland Club, 326 San Francisco Street, El Paso, Tex.

. . . **The new drug, dramamine,** may cause undesirable effects when used as a cure or preventive for air sickness, CAA warns. Tests show drowsiness is a common side reaction to the use of dramamine. CAA officials believe that while these effects would not be harmful to passengers, they might be hazardous to a pilot flying an airplane.

. . . **A single aircraft** flying from San Francisco to Australia requires the filling in of 5,604 documents before it can take off.

. . . **Beechcraft** has instituted a "courtesy service" program by which factory representatives, visiting distributors and dealers, give free inspections to Bonanzas to acquaint owners with the general condition of their planes and to answer any questions they may have.

Not bugs under a microscope but new omni-range antenna for lightplanes are these V-shaped designs. Left to right are ARC's Type A-13, Lear Omnitenna, and Narco omni unit.

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MILITARY NEWS

. . . **Under 48-group Air Force,** the U.S. will have four B-36 bomber groups, 10 medium bomber groups (B-29s, B-50s and B-47s), six strategic reconnaissance groups (two equipped with B-36s), one tactical reconnaissance group, six troop carrier groups, 20 fighter groups, and one light bomber group.

. . . **The Soviet Union** does not (1) have any military planes with a range greater than 1,000 miles, (2) have any Russian-designed jet bombers, according to reports circulated in England.

. . . **Eleven new fighters** and several research craft displayed at England's recent Farnborough airshow included:

DeHavilland Venom, high-altitude interceptor developed from the *Vampire.* The *Venom* is powered by a DeHavilland *Ghost* turbine, 66 per cent more powerful than the *Vampire's Goblin* engine. It is a single-seater with *Vampire's* tail and fuselage units but a thinner wing.

DeHavilland 113, Britain's first jet night fighter, has radar installed in a bulbous nose. It has "notable performance advantages" over the *Vampire,* from which it also was adapted.

Avro 707 (see photo), a supersonic research plane with sharply sweptback

triangular wing. It is powered by a Rolls-Royce *Derwent* turbojet.

Vickers-Armstrong 510, supersonic research plane, which "resembles a finned bullet." It also is powered by a Rolls-Royce jet engine.

. . . **Economy orders** by Defense Secretary Louis Johnson will force loss of 18,000 USAF civilian employees, discharge of 3,129 Air Force reserve officers and closing of 18 bases.

. . . **Proposed refinement** of North American F-86 (to be designated F-93) would have flush air intakes and needle nose.

. . . **Long-distance missile** range at Banana River, Fla., should be in operation by July, 1951. It will replace the present U.S. missile range at White Sands, N.M.

. . . **The 301st Bomb Wing** will be first Air Force unit to be equipped with the six-jet Boeing B-47, now in initial stages of mass production. The 91st Wing will be the first unit to receive the reconnaissance version, the RB-47. Planes will be based at Barksdale AFB but their receipt is not scheduled for the immediate future.

. . . **Only jet bomb group** in the USAF today is the 47th, equipped with four-jet B-45s.

. . . **Gloster Meteor,** Britain's two-jet fighter powered with new Rolls-Royce *Avon* engines, can streak to 40,000 feet in four minutes, it is claimed. Last summer, U.S. Navy sources said its fast-climbing McDonnell *Banshee* (F2H-1) could reach 40,000 feet in "about eight minutes."

. . . **First official** "Armed Forces Day" will be observed May 20, 1950. Defense Secretary Johnson recently abolished Army Day, Navy Day and Air Force Day, designating the third Saturday in May for a combined observance by all services.

. . . **Air Guard** strength at summer's end was 41,941 (6,730 officers and 35,211 airmen).

. . . **Marine Air Corps** will have 120 jet fighters by next July. Most of them are expected to be Grumman *Panthers* (F9F) and McDonnell *Banshees.*

. . . **First flight** of Northrop B-49 equipped with jets plus turbo-prop engine is expected late this year. The turbo-prop (Northrop XT-37-1 *Turbodyne*) is installed for test purposes, mounted near center of the Flying Wing in pusher fashion.

. . . **National Security** "demands a minimum of 70 air groups, which should not be reached at the expense of cutting arms aid to Europe," says Gen. Carl Spaatz, ex-chief of staff, USAF. "Cutting that strength back to forty-eight groups endangers the security of the country."

. . . **Flight tests** on the twin-jet Lockheed F-90 penetration fighter, now underway at Muroc AFB, will continue for nearly a year.

. . . **Applicants** for aviation cadet training in the Air Force must now have two years of college training in an accredited institution and must be unmarried.

HERE'S CONCLUSIVE EVIDENCE FROM THE PROVING GROUNDS!

The widespread use of Champion Ceramic Aircraft Spark Plugs by every leading airline means a great deal to you people who either fly or maintain airplanes on a scale short of airline magnitude. These leaders buy and use spark plugs only after thousands of hours of comparative testing, even *after* they have been recommended by engine manufacturers! Like leaders in other industries, their size and resources permit—and their responsibility to the public necessitates proving—that everything they use be absolutely dependable. As a result, regardless of the size of your engine, you can equip it with Champions and fly with confidence and utmost economy.

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★ **Extra ruggedness** — Beechcraft Bonanza framework is stronger than conventional construction. Shock and stress tests far surpassing CAA requirements have proved the extra ruggedness of every inch of the Beechcraft Bonanza—from landing gear to cabin roof!

★ **Extra economy** — Extra low fuel consumption of 9.5 gallons per hour at cruising is part of the Beechcraft Bonanza's operating economy. Another vital "extra" is low maintenance due to freedom from engine overload. The Beechcraft Bonanza saves your money!

★ **Extra safety** — The Beechcraft A35 Bonanza has been dived under radio control at 275 mph—and pulled out unscathed at 3 G's! On the ground, the Beechcraft Bonanza's wide tread, long wheel base, and cross-braced struts defy the roughest handling, the roughest terrain.

★ **Extra performance** — No airplane yet designed can beat the high performance of the Beechcraft Bonanza—its unexcelled combination of speed, range, and fuel economy. Its flight characteristics make it one of the easiest planes in the world to handle!

★ **Extra power** — The extra margin of power in a Beechcraft Bonanza comes from aerodynamic design which requires but 56% of the engine's power at cruising. Never before has so little power been needed for such high performance by so rugged a plane!

★ **Extra range** — The extra range you get in a Beechcraft Bonanza—750 miles—makes it *real transportation*. Equipped for long distance flight, it is the most practical of all planes for business use—with a *commercial* margin of safety, speed, and range!

★ **Extra utility** — The Beechcraft Bonanza is a business plane, engineered for extra usefulness as a business vehicle. It can be operated the year around. It can get into small, unpaved landing fields as well as modernized airports. It is ready to go—365 days a year!

★ **Extra comfort** — From the moment you step (not climb!) into a Beechcraft Bonanza through its wide, auto-type door and settle yourself in its uncrowded 4-place interior, you're conscious of superb comfort. Its sound-proofing is the standard of comparison!

★ **Extra luxury** — Skilled design and placement, with superb interior appointments, make the Beechcraft Bonanza an aerial limousine. You'll lean back and relax and enjoy air travel as never before! Its only rival for sheer luxury is the multi-engined airliner itself!

● These are only the highlights among hundreds of reasons why the Beechcraft Bonanza is a better buy! *See* it today! A note on your company letterhead will bring illustrated brochures describing the Beechcraft Bonanza's many *extra* advantages. Write to Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

Compare these performance features

- Top speed, 184 mph
- Cruising speed, 170 mph
- Range, 750 miles
- Service ceiling, 17,100 feet
- Fuel economy, 9½ gal. per hour

Compare these comfort features

- Exclusive retractable step
- Limousine entrance
- Insulated, sound-proofed cabin
- Quickly removable rear seat
- Luggage compartment accessible two ways

Beechcraft

BONANZA MODEL A35

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

FLYING
VOLUME 43 NUMBER 5
NOVEMBER, 1949

The MEN BEHIND THE RED AIR FORCE

The key figures of Soviet aviation are the men who design the new warplanes.

By
CHARLES W. CAIN

Former editor of the British *Aeroplane Spotter*, the author is a foremost aircraft recognition authority. He is founder of "Air-Britain" and an expert on Soviet historical and military aviation.

THE COMPOSITE Soviet aircraft designer is a man in his early 50's, who has spent from 20 to 30 years in aviation engineering, and who is likely to sport the military title at least of a major general (or as the Russians say, "general-maior"). He is much more likely to be the son of a peasant than of a manager or official under the Tsars, and he has come up the hard way on a combination of political acumen, allegiance to the Communist cause, and engineering ability.

As the photographs accompanying this article indicate, the Soviet aircraft designers are a group of very hard-boiled and competent looking customers. They have to be. In addition to their engineering jobs they are often called upon to fulfill even more difficult tasks, such as serving as deputies on the Supreme Soviet, running aircraft factories or undertaking

Yak-9 fighters, designed by Yakovlev, are still operational.

SOVIET'S LEADING AIRCRAFT DESIGNERS TAKE CUES

Josef Stalin

Stalin, like Hitler, long realized the value of strong military aviation and has spurred the Soviet Union on in its development program. Stalin repeatedly has urged Soviet designers and technicians to produce the world's finest airplanes in every category. Under him is Andrei Nikolai'evich Tupolev, now head of the U.S.S.R.'s most important research center. Stalin has always identified himself publicly with Soviet aviation and the Red Air Force.

Andrei Nikolai'evich Tupolev

Tupolev has been head of the Ts.A.G.I. (Central Aero-Hydrodynamics Institute) since Prof. N. E. Zhukovskii died in 1924. He was born in 1888, the son of a Tsarist Government official, and in 1918 helped to found the institute he now heads. He bears the military title of major general. Tupolev was reported imprisoned in 1938 but five years later was awarded a Stalin prize, apparently for the TU-2 attack bomber. Now busy in jet research.

Aleksandir Serge'evich Yakovlev

Only 43, Yakovlev is one of the youngest top aircraft engineers in the Soviet Union. He is a lieutenant general, and is People's Vice-Commissar for Aircraft Production. He has won four Stalin prizes for his Yak-1, Yak-3, Yak-9 and Yak-15. He was a model plane flyer and early prize-winner and has received many top awards since. Yakovlev believes in small planes with light wing loadings for maneuverability and slow landing speeds.

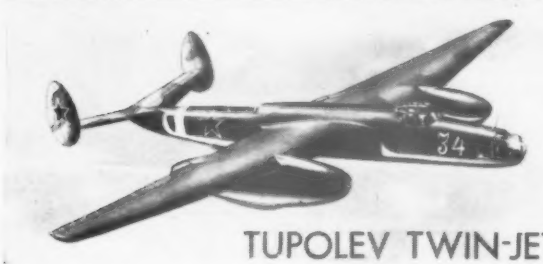
political duties in line with their memberships in the Communist party. If they are given to any vanity, it is the wearing of be-ribboned medals on their broad chests. These are necessary appurtenances because without the honors these awards represent they do not get to be airplane designers at all.

These men do not, as many wishful thinkers fondly imagine, represent a high level of incompetence. On the contrary, although the Russians owe a great debt to German research, they are undoubtedly men of the greatest ability working under many more difficulties and distractions than their American counterparts. And the planes they build are good planes and getting increasingly better.

Aviation in the Soviet Union has a long and honorable history—perhaps as honorable and certainly as long as in the United States. This is true even discounting the Soviet claim that a Russian gentleman by the name of Mozhaiskii flew successfully from an airdrome near St. Petersburg (now Leningrad) on (hold your hats) July 20, 1882—21 years before the Wrights first flew.

MIG UTKA

DFS 346
JET RESEARCH



TUPOLEV TWIN-JET

LA-8

FROM STALIN IN EMPHASIZING JET WARPLANES . . .

Sergei Vladimirovich Il'yushin

Il'yushin was born in 1894, the son of a peasant. He began work at an airport near Moscow at the age of 16. In World War I he managed a transfer to the air force and advanced to being a mechanic. Later he entered Zhukovskii Air Academy and in 1926, at the age of 32, was graduated as an engineer. He is best known for his famous Il-2 *(Stormovik)*, a rugged ground support plane. His Il-12 has replaced the DC-3 variants on Soviet Aeroflot routes.

Semyon A. Lavochkin

Lavochkin appears to be the leading piston engined fighter designer in the Soviet Union. A single-seat jet fighter, the LA-15, was put into large scale production to cope with the Fw-190A. Development models of this plane as high as LA-11 have been reported and LA-9's with jet units on the wings have been seen. Lavochkin was born in Smolensk in 1900 and left school at age of 17 to fight with the Red Army. He is a "Hero of the Soviet Union."

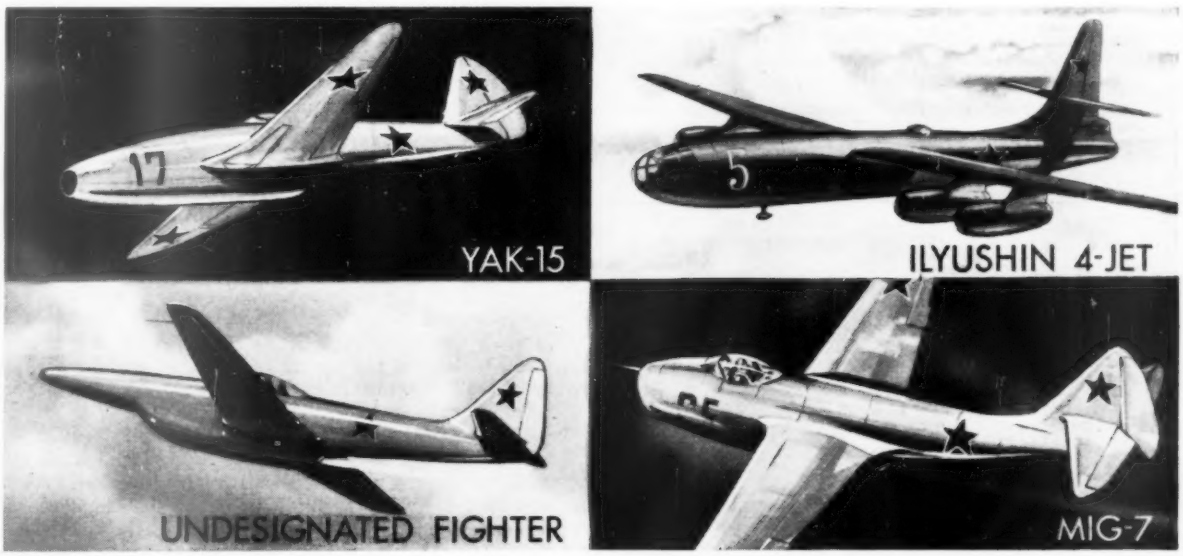
Artem I. Mikoyan

Working with co-designer Mikhail I. Gur'evich (whose initials make the designation initials "MIG"), Mikoyan first came to notice in 1940 with the advent of the stubby MIG-1 single-seat fighter. Later MIG designs include a twin-radial-engined fighter, and the powerful all-metal twin-jet single-seat MIG-9, which is in squadron service. The MIG team also designed the *Utka*, a canard pusher high-winged plane that converts to a wingless sledge.

The Red Revolution which started in 1917 and apparently continues even to this day robbed the modern Soviet Union of many competent designers who decided to take their talents elsewhere. Two of the best known in the United States today are Igor Sikorsky and Maj. Alexander de Seversky, and there are others. Nevertheless, other brilliant men rose to take their places.

The man who planned Soviet Aviation as it is today, and was largely responsible for its basic organization is Prof. N. E. Zhukovskii, who died in 1924. He founded the Zhukovskii Military Academy and the Ts.A.G.I. (Central Aero-Hydrodynamics Institute) in Moscow, which is the most important aviation research center in the Soviet Union. He planned and built the first wind tunnels in Russia and even though he has been dead for 25 years his influence continues directly through the work of his pupil, the important designer Andrei Nikolai'evich Tupolev, who took over when Professor Zhukovskii died and has remained the head man ever since.

Behind Tupolev stands Stalin who, like Hitler, realized



. . . OTHERS WORK ON NEW AND FASTER ENGINES

Nikolai N. Polikarpov

Polikarpov is famous as the designer of the perennial PO-2 biplane which has been in service since 1928. This craft was first known as the U-2, but when Polikarpov died in mid-1944, the plane's name was changed to hónor him. He designed many of the single-seat fighters of the Red Air Force, such as the I-15, I-16, and I-17, and the widely used reconnaissance biplane bomber, the R-5. He was a deputy of the Supreme Soviet at his death.

Aleksandir Aleksandirovich Mikulin

Mikulin is an aircraft engine designer, a major general, and director of Experimental Factory No. 300. He has developed engines for tanks and torpedo patrol boats as well as for aircraft. Most of his airplane engines have been developed from foreign designs. The AM38-AM-42 series was developed from the German BMW VI, 12-cylinder V-type liquid-cooled engine. Mikulin was born in 1898, son of an inspector of technical factories.

Arkadi Dmitr'evich Shv'etsov

Shv'etsov became famous for his original five-cylinder radial engine, the 110-140-h.p. M-11, which was first produced in the middle 1920's. This engine has been used on nearly every Soviet lightplane and light transport design for the past 20 years. He also developed the ASH-82 series of 14-cylinder radials from the Pratt & Whitney Twin Wasp, and the ASH-90 from the Wright Duplex Cyclone. He plays the piano, paints, plays chess.

the value of a strong military air arm and, since the end of World War II, has prevailed upon all Soviet designers and technicians to produce the world's finest airplanes in every category. As in the early 1920's, the Soviet Union today is using German brains to help with the task of carrying out Stalin's decree that Soviet planes must go "higher, faster and farther."

Even whilst the Red Revolution was being terminated in distant parts of what is now the Union of Soviet Socialist Republics, airplane designing had gone on. Apparently a small single-engined biplane flying boat, designed by Dmitri P. Grigorovich and called the M-9, was available in 1918.

New designs for what was to be known as the Red Air Fleet (now Russian Air Force) were not available in quantity until the early 1920's, and in the main even then the Red Air Fleet had to be content with tried foreign designs, constructed under license, such as the Avro 504 (known as the U-1) of about 1925.

The Father of Red Air Power

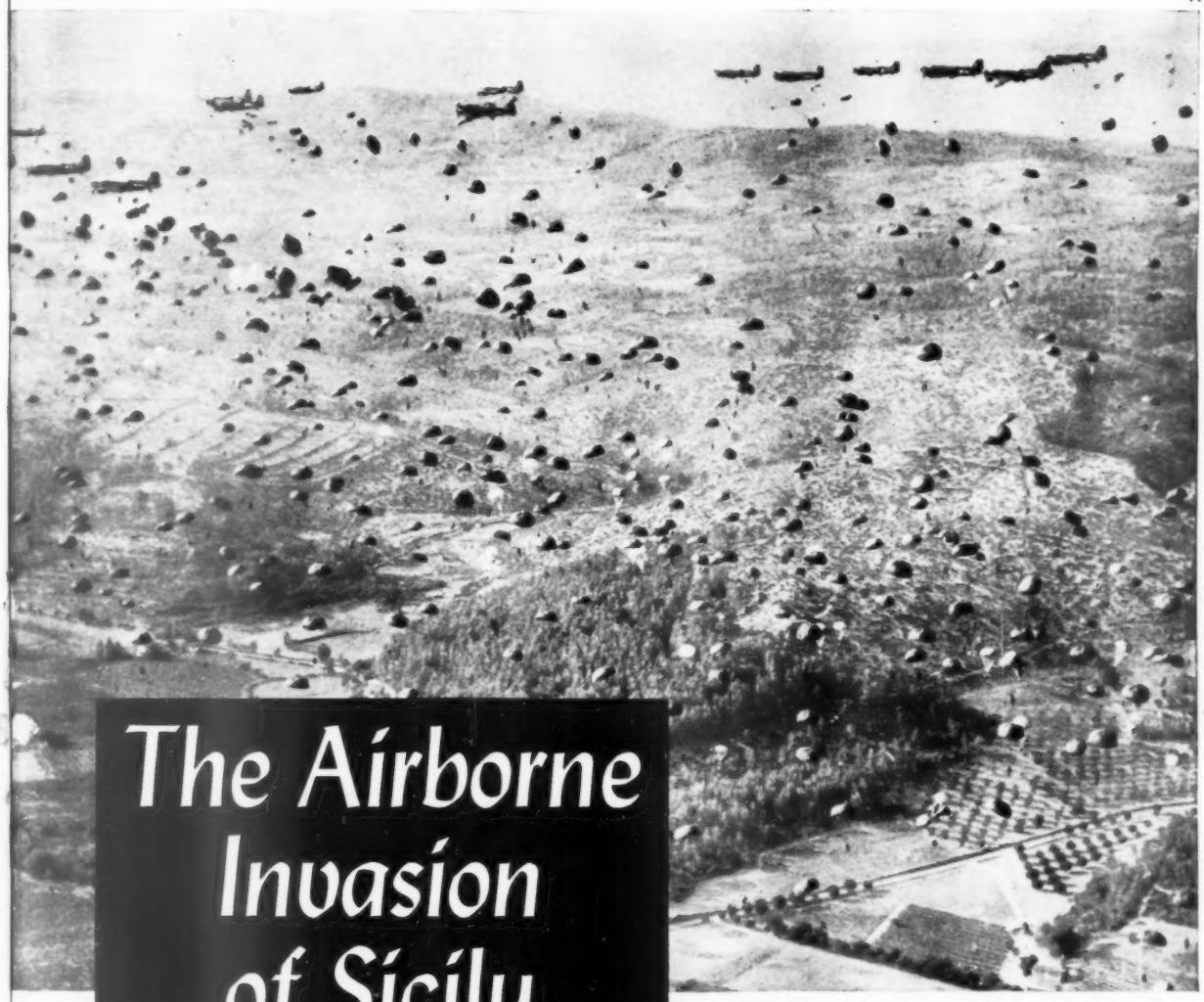
Prof. N. E. Zhukovskii, who died in 1924, founded the Zhukovskii Academy in Moscow and the Ts. A.G.I. (Central Aero-Hydrodynamics Institute), the most important aviation research center in Russia. He also built Russia's first wind tunnels for air research.

The reason for the long periods of service of the top Soviet designers is not difficult to find. Once they had proved their abilities and loyalty in the turbulent and difficult 1920's they were quickly incorporated into the struggling new industry. Since then they have remained at the top. Even though few have ever been outside the Soviet Union they have shown as much industry and courage in trying out new ideas as their western world counterparts. The main difference is that if a Russian design does not come up to expectation, the engineer is held much more personally responsible. Records show that on occasion leading engineers have served terms of "protective custody" in jail. But there must be many engineers outside Russia who have thought that they could work more speedily if the non-design influences could be removed for a spell.

To contrast the old-line Soviet designer with the newcomer who fought his way up through what must have been serious hierarchical difficulties, there could be no better comparison than that between Andrei Tupolev, the No. 1 man, and Aleksander Yakovlev, a brash "youngster" of 43 who is one of the most brilliant designers in the world.

Tupolev was born in 1888, the son of a Tsarist Government official. He had the advantages of formal engineering education at an early age, including training at the Moscow Technical High School, from which he was graduated in 1908 at the age of 20. In 1918, at 30, he helped to found the Central Aero-Hydrodynamics Institute which he now heads.

His first practical design was made public in 1922. This was the ANT-1 (from his initials A. N. Tupolev), a low-wing, single-engined, single-seat monoplane. In 1924 appeared the ANT-2 a small high-winged, single-engined passenger plane. At least 14 other designs followed up to 1940, including twin-engined, (*Continued on page* 75)



The Airborne Invasion of Sicily

First large-scale parachute drops by Allied airborne troops began in 1943 in Mediterranean region.

Over half our plane losses came from Allied ack-ack. Why?

IN MID-1943, when Allied troops were splashing ashore on Sicily and beginning their push toward the Italian coast, U. S. newspapers carried big headlines but few facts about airborne invasions.

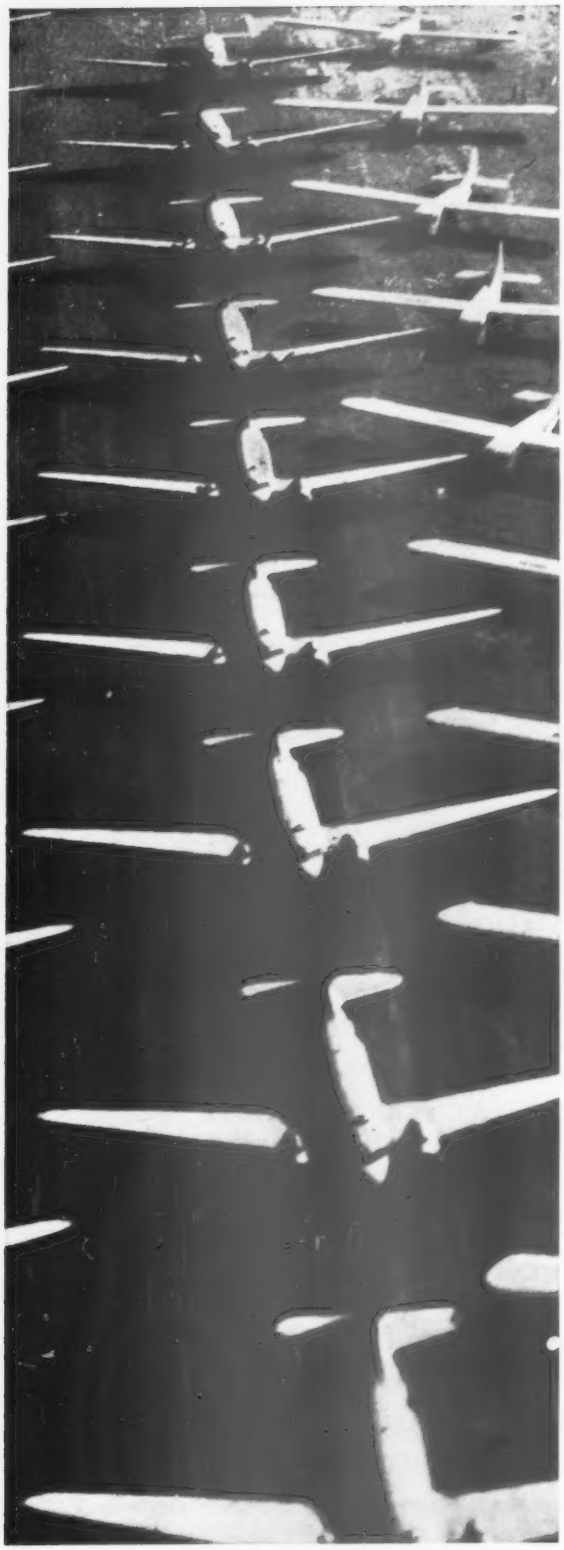
Disconcerting information began filtering out. U. S. Naval forces and Army shore installations had shot down C-47's loaded with paratroopers. Coming in to support hard-pressed ground forces, nearly half of one troop carrier mission had been destroyed by Allied antiaircraft.

The early airborne missions could almost be renamed "Operation Snafu." The paratroop and glider forces too frequently never reached their objectives. In one case, a third of all gliders landed in the sea.

This is the story of the birth of U. S. airborne operations and of the mistakes which were the natural accompaniment of using a new and untried method of warfare. It is excerpted from Volume II of "The Army Air Forces in World War II," prepared under the editorship of Wesley Frank Craven and James Lea Cate and published by the University of Chicago Press.

THE FIRST TIME the Allies undertook large scale airborne operations in World War II was in the final assault upon Sicily. Two missions had been scheduled for the hours immediately preceding H-hour at 0245 on July 10, 1943. One was coded LADBROKE, a drop in the neighborhood of Syracuse for the purpose of seizing the canal bridge south of that city to facilitate the advance of the British 8th Army. The other was HUSKY NO. 1, a drop near Farello to capture the high ground and a road junction six miles east of Gela, a position which commanded the exits from beaches over which the American 1st Division would storm ashore in the next few hours.

(*Continued on next page*)



Douglas C-47's line up with gliders for invasion take-off. In 666 sorties, we lost 42 planes (25 downed by Allied fire).

For each of the two missions a complicated dog-leg course had been charted, running east from Tunisia to Malta and thence northward to Sicily—a route fixed in part by the necessity of avoiding friendly naval vessels whose orders were to fire on any aircraft in their vicinity and in part by the requirement that the planes maintain radio silence, which made visual aids to navigation essential. In LADBROKE the paratroopers would land by glider, in HUSKY NO. 1 they would drop by parachute from troop carrier planes.

LADBROKE got under way at approximately 1800 on July 9 (D minus 1) when 133 tow planes began to take off from fields in the El Djem area of Tunisia, each plane pulling a loaded glider behind it. All but 28 of the planes were American C-47's belonging to the 51st Wing of Northwest African Air Force Troop Carrier Command. Except for eight British *Horsas* all of the gliders were American-made Wacos. All gliders were manned by British pilots and the more than 1,600 paratroopers they carried were members of the British 1st Airborne Division.

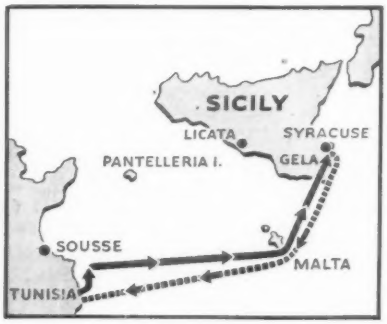
The formations flew until darkness under fighter cover furnished by planes of the 1st Air Defense Wing. No enemy aircraft were encountered. A strong wind which had come up during the afternoon added to the difficulty of staying on course, and most of the planes, having drifted southward, missed the first check point on Malta. Corrections were made, however, and the planes were on course as they approached Cape Passero in southeastern Sicily.

After passing that point, they climbed to a release altitude of 500 feet for the *Horsas* and 1,500 feet for the Wacos. Some pilots, noting the velocity of the wind, went as high as 1,800 feet before signalling for the release of their gliders. Flak at several points along the coast caused many pilots to swing wide from the fire and get off course. There was no fire within several thousand yards of the two release zones, one just south of Syracuse and the other over its western suburbs on the road to Floridia, and the enemy attempted no interceptions.

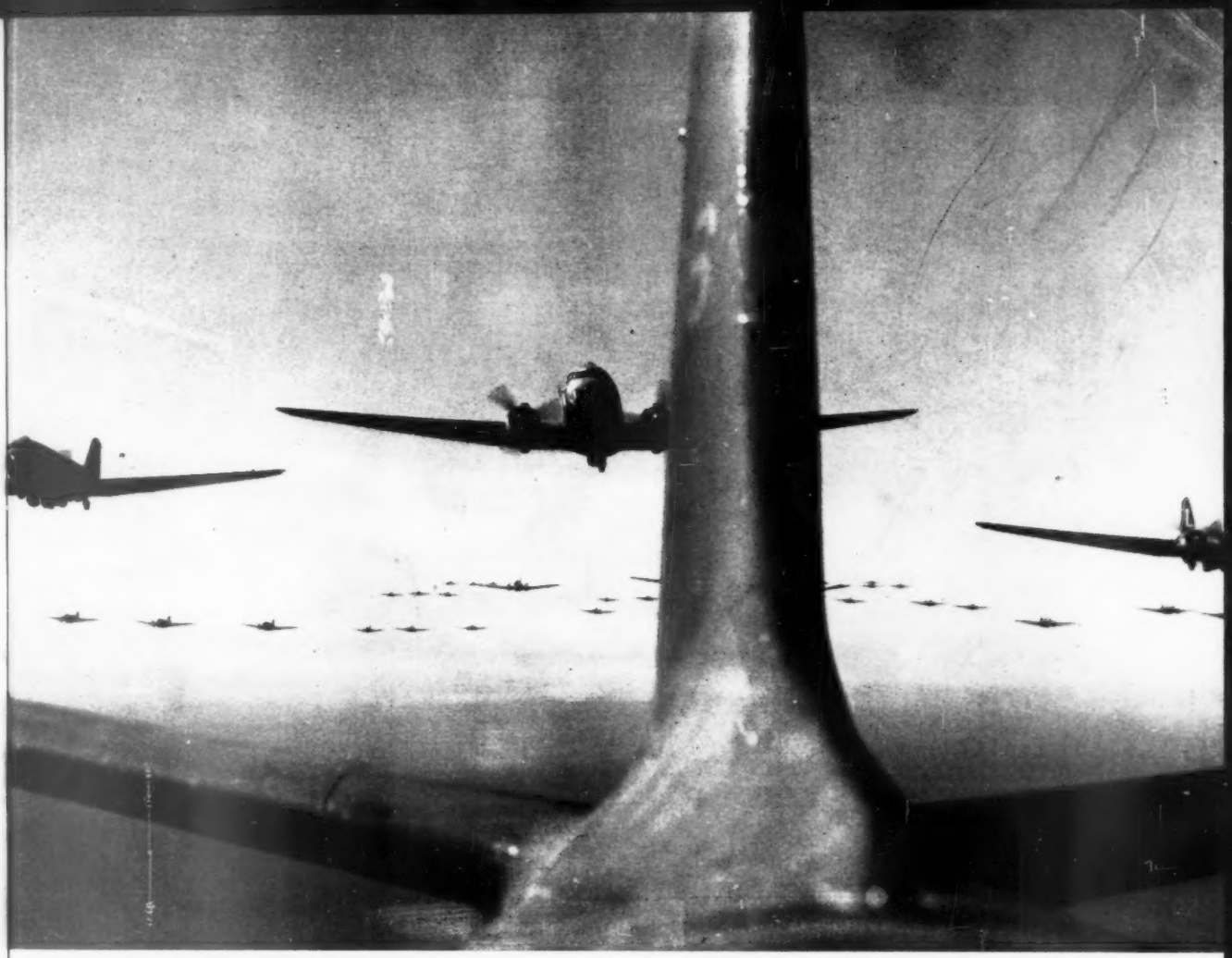
But with the wind high and some of the planes obliged to make two or three passes because of poor visibility, the release areas became congested. Contributing further to the generally poor execution which characterized the mission was the inadequate training of the glider pilots. Some of them had not advanced beyond the first solo stage at the time of their arrival in Africa. There was only three weeks left for TCC to train them in navigation and night flying.

Some of the glider pilots released before receiving the signal from the tow pilot. Some, unfamiliar with the American-built Wacos, on release turned their gliders in a reverse direction from the proper course. Not a single

Here are routes flown by planes in mass drops on Sicily.



LADBROKE



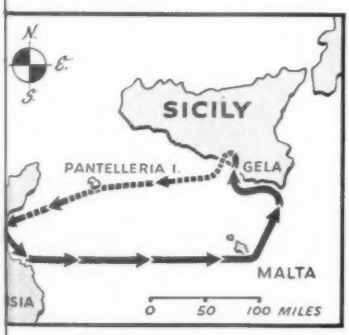
Mass glider invasions of Sicily revealed major errors in operational planning. But three of the four strikes were considered "tactically successful," and lessons learned during the Sicilian campaign were utilized later in the giant airborne operations against Europe.

tow plane was lost, but of the 133 gliders released only 12 landed in the general vicinity of the landing zone, at least 47 came down in the sea, and the remainder landed at various points in the southeastern part of the island.

Poorly executed as it was, the mission nevertheless served a useful purpose. The eight officers and 65 enlisted men who came down in the drop zone reached the canal bridge south of Syracuse and held it long enough for advance patrols of the ground troops to arrive. Then the glider troops defended the bridge while a brigade of the British 5th Division moved across.

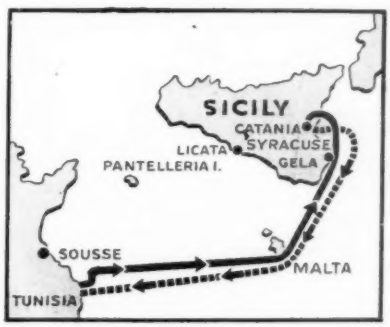
Even the troops who landed far from the drop zone contributed heavily to the success of the initial ground force operations. Widely scattered and groping about in the dark, they attacked such of the enemy's positions as they could find and thereby added to the confusion and disorganization of his defenses and reserves.

HUSKY NO. 1, the American paratroop operation, in many respects closely paralleled LADBROKE. The 226 C-47's, carrying 2,781 paratroopers of the U. S. 82nd Airborne Division and 891 parapacks, assembled over the Kairouan area soon after 1800 (*Continued on page* 63)



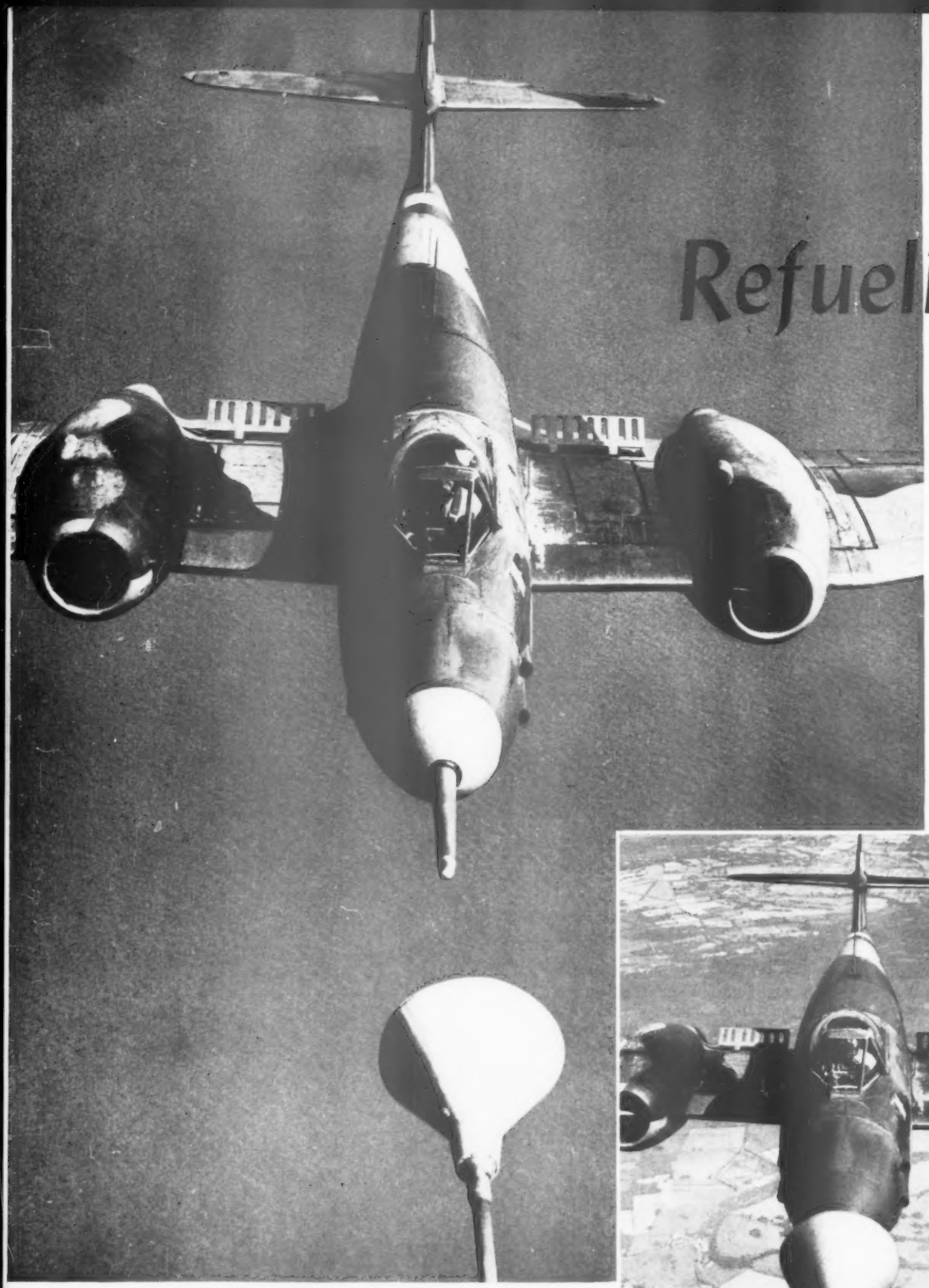
HUSKY No. 1

HUSKY No. 2



FUSTIAN

Refueling



Crucial moment in refuelling comes when the Meteor rams probe-like device on nose into cone trailing from tanker. Once automatic connection is made (inset) slackness is taken up by drum in tanker, and fuel begins to flow at rate of about 100 gallons per minute. Meteor's tanks hold 325 gallons. Note jet's extended dive brakes.

British Meteor remains airborne for over 12 hours to set a jet endurance record.

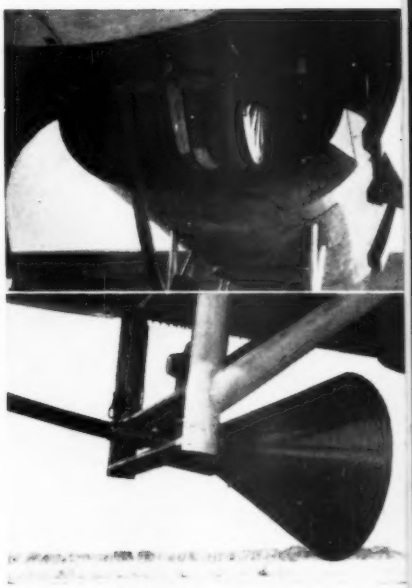
g a Jet in Mid-Air

ONE OF MILITARY aviation's top problems is how to make jet fighters fly farther. They gulp fuel at a prodigious rate, can seldom remain airborne for more than a couple of hours.

Recently a British Gloster *Meteor*, using an airborne refuelling technique developed by Flight Refuelling, Ltd., remained airborne for 12 hr. 3 min. over England's south coast. It was the longest flight ever made by a jet plane, and pointed to possibilities for using jets for longer missions than have hitherto been practicable.

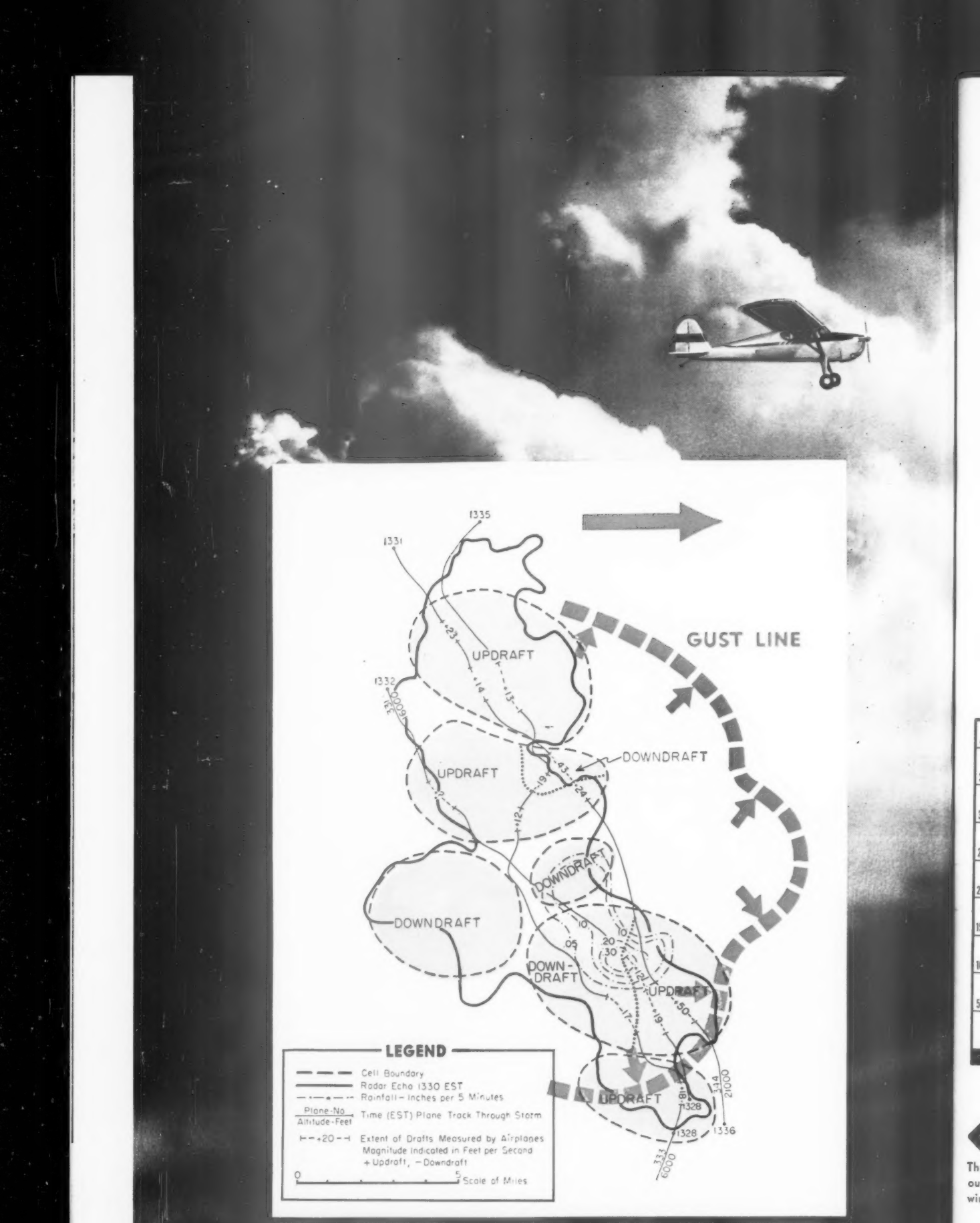
Ten times during the record flight, a *Lancaster* "tanker" rendezvoused with the *Meteor*. The larger plane trailed a 65-foot length of flexible rubber hose with a metal cone attached to its end. About 15 feet behind and just below the tanker, the *Meteor* (equipped with a probe-like intake device on its nose) flew with flaps extended at 190 m.p.h. and rammed gently into the cone, which locked automatically. Once connected, each refuelling took between 1½ and 2 minutes. A 300-pound pull automatically broke the connection. END

PHOTOGRAPHS BY CHARLES E. BROWN



Tanker equipment includes (top) drum containing 65 feet of flexible hose and (bottom) conical device on end of hose. Diameter of the cone is about three feet.

Gloster and tanker rendezvous over Poole Harbor, England. Each of 10 refuellings on the record flight took between 1½ and two minutes.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-05
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UPDRAFT
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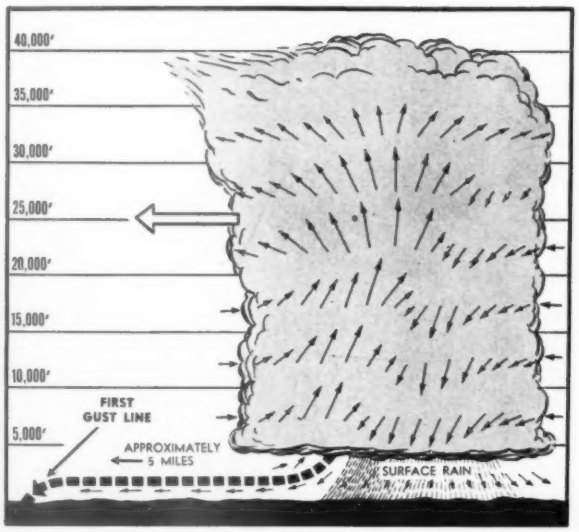
-19
-50
UPDRAFT
1334
21000
1328
1328
1336
1331
6000
LEGEND
Cell Boundary
Radar Echo 1330 EST
Rainfall – Inches per 5 Minutes
Plane-No / Altitude-Feet
Time (EST) Plane Track Through Storm
+20
Extent of Drafts Measured by Airplanes
Magnitude Indicated in Feet per Second
+ Updraft, – Downdraft
0
5
Scale of Miles

HOW TO FLY AROUND THUNDERSTORMS

It isn't only flying in thunderstorms that's dangerous. Strong winds surround them.

EDITOR'S NOTE

This is the second of two articles based on findings of The Thunderstorm Project. Last month's article, "How To Fly In Thunderstorms," was written for instrument pilots. This article is designed for lightplane pilots.



The first gust line precedes the storm by perhaps five miles. In an instant it can bring strong winds from a new direction.

Thunderstorm of July 9, 1946, showed this outline. Note outward direction of surface winds forming gust line (strong red line).

THE AIRPORT lay serene in the late afternoon haze. The sun had gone behind a growing overcast. The wind was five to eight m.p.h. from the east and planes were landing into it down the west-east runway. The airport manager came out of his office and watched a thunderstorm bearing towards him from the southwest.

The heavy cumulus clouds towered ominously to untold heights. Insects chirped anxiously in the weeds at the side of the hangar. One by one, the lightplanes in the traffic pattern came in to land, chased down by the approaching thunderstorm. In the haste of getting down, no one noticed that the wind sock now hung limp.

The pilot of the single *Cub* left in the air approached the runway slowly, bent on painting her on in a three-pointer. He was only 50 feet high when the gust line struck from the southwest. The wind had almost reversed itself in seconds and, unknown to the pilot, what had been an upwind approach was now cross-wind or slightly downwind. The plane stalled out instantly because of the downwind component of the wind and its severe turbulence. If he had been 50 feet higher he would have rolled it up in a ball. As it was, only the gear and a wing tip were washed out. He was lucky at that.

How did it happen? The pilot knew that somehow the approaching thunderstorm was responsible but he did not understand how. It was still well over a mile away and eventually missed the field, passing just south of it. But how did this thunderstorm cause the accident, and how could the pilot have guarded against it?

The answer to this question and to others vitally affecting lightplane pilots can now be given with authority for the first time. And the answers, furthermore, fall in a logical pattern that all pilots can and should understand.

They have been made available by the Thunderstorm Project, a cooperative research undertaking of the Weather Bureau, Air Force, Navy and NACA under the direction of Dr. Horace R. Byers of the University of Chicago. Roscoe Braham is official in charge of the Thunderstorm Project. Dr. Byers emphasizes that lightplanes and their pilots should never fly into thunderstorms. Very often, however, they are compelled to fly in the *vicinity* of thunderstorms. The Thunderstorm Project tells them much of what they ought to know in such hazardous flight.

To understand how to fly around thunderstorms, pilots first should understand the structure of the storms. Each storm contains one or more centers of convective activity called thunderstorm cells, each of which may develop more or less independently of those adjacent to it. Each cell passes through three different stages in its life cycle:

1. The cumulus stage—in which the cell contains only updraft from the base to the top of the cloud.

2. The mature stage—in which the fall of raindrops starts a local downdraft in a part of the region in which updrafts had existed.

3. The dissipating stage in which the entire lower part of the cell contains a gentle (*Continued on page* 69)

Fairchild T-31

Cockpit of new trainer is standardized for simple flying.

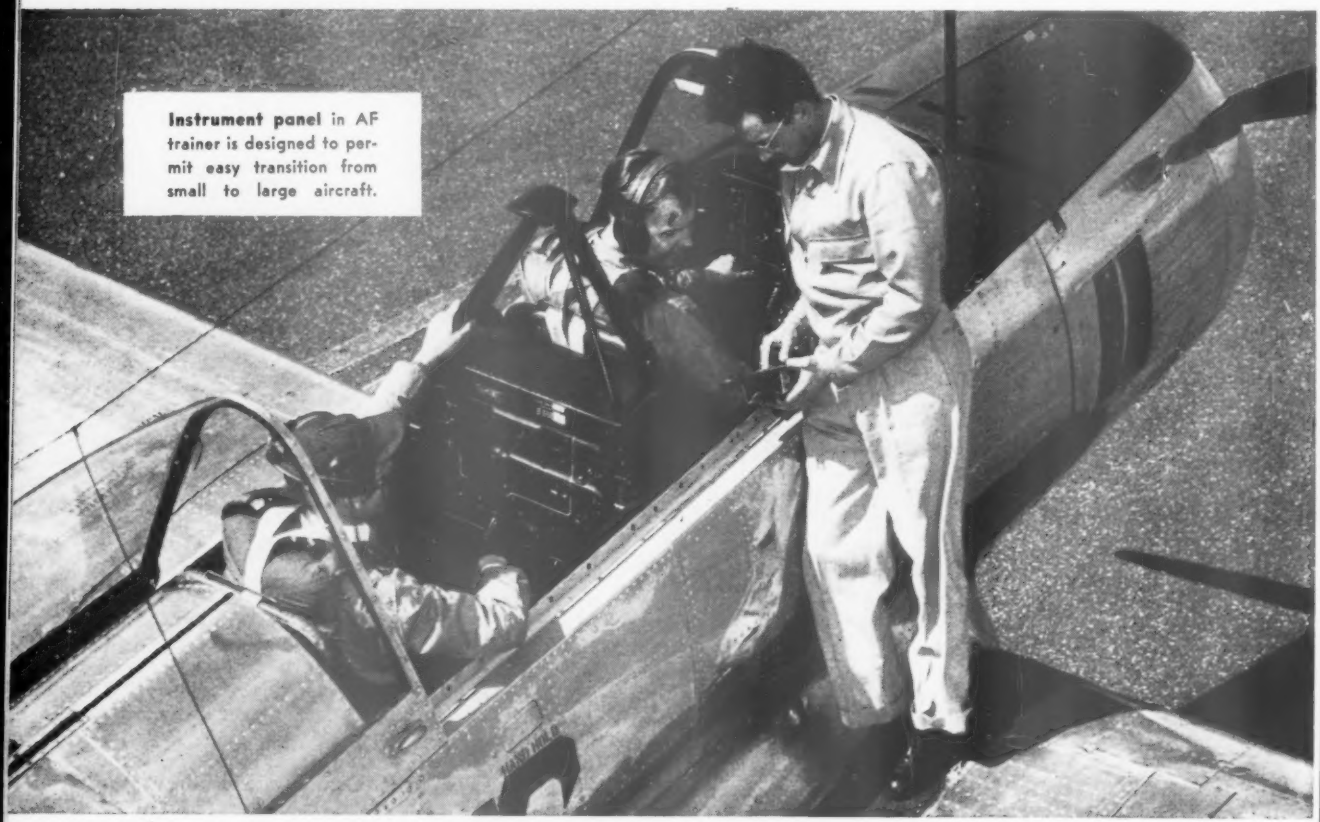
WHEN military experts and Fairchild engineers set out to design the Fairchild T-31, they had as their goal an arrangement that would eradicate mental confusion in the cockpit. They aimed to tailor a cockpit to fit the pilot rather than the other way around.

The Fairchild T-31, the new Air Force trainer which resulted from this happy aim, was designed so that it could be operated in the simplest manner possible. It can be flown by using the same controls found in an Aeronca or any similar lightplane. It can be flown without its landing gear being retracted. Flaps and controllable prop need not be used.

As a student's proficiency develops, however, he can gradually learn to use all the T-31's big-plane equipment.

Fairchild's new Air Force basic trainer started out originally as a Navy design known as the XNQ. It was to be an all-metal two-place low-wing *primary* trainer powered by a 320-h.p. radial engine and equipped with retractable gear and a controllable pitch prop. It had a 140 m.p.h.-plus cruising speed. But the Navy never did order the XNQ in quantity and the Air Force picked it up as the answer to its needs for a trainer with a functional cockpit, yet having the characteristics of advanced planes.

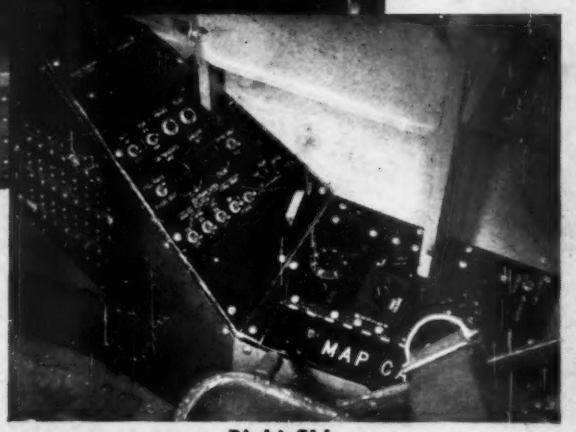
The need to have standardized cockpit layouts has long been recognized by aviation authorities. The Navy began experimenting in 1941, trying to find a solution to the confusing radio situation. Up to that time, no one had designed radios to fit in an airplane, and those who bought



Instrument panel in AF trainer is designed to permit easy transition from small to large aircraft.

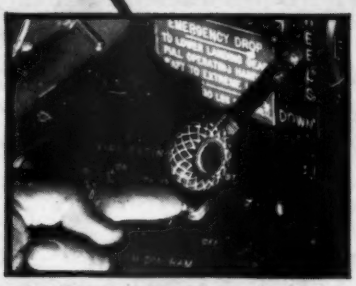
THE T-31's FUNCTIONAL COCKPIT

Left Side



Right Side

Flap lever is shaped like a flap



Landing gear lever is small wheel

Arrangement of cockpit in Fairchild T-31 is orderly and logical. All engine controls are on the left side and all electrical switches on right. Cockpit is planned for safety and easy progression to advanced airplanes.

them didn't know where to place them. An orderly arrangement of radio items was the first real standardization attempted.

The development of a standardized cockpit was given tremendous impetus after the National Research Council held a conference on crash injuries in 1944. Members of the Council, the Army and the Navy formed a joint committee on aircraft cockpit layouts and invited the British to participate. Mockups were built and analyzed. Eventually a basic arrangement of controls was determined and research was continued. It was already obvious that any cockpit arrangement for trainers should be followed in cockpits for advanced and combat aircraft. Such a plan eliminates the necessity for a special pilot orientation course for each airplane.

The following principles were formulated:

1. Each control should look like the part of the plane it actuates. And so the gear lever actually is shaped like a wheel and a strut. The handle of the flap lever is shaped like a flap, thick in the front and (*Continued on page* 66)

Transcontinental plane, a Wright E-X, and pilot (wearing cap) were sponsored on flight by makers of "Vin-Fiz," a popular grape drink.

Coast-to-Coast on a Kite

By HAROLD HELFER

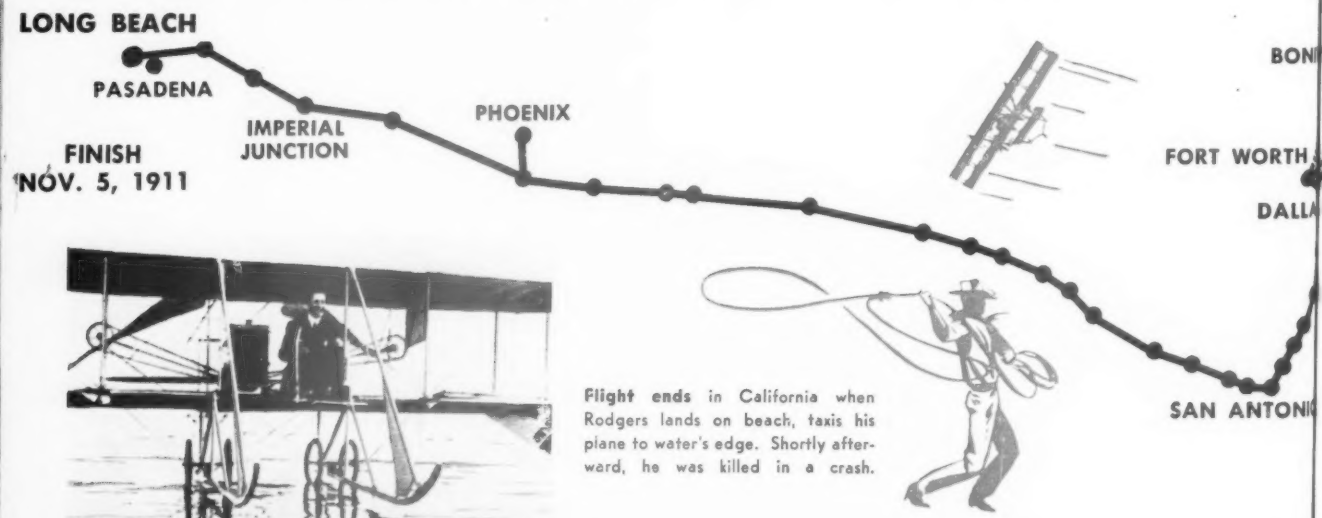
NEVER BEFORE had the roofs of New York City held so many excited people. On September 17, 1911, thousands of New Yorkers were craning skyward for a glimpse of 32-year-old Calbraith P. Rodgers and his powerful Wright E-X biplane.

Airplanes were extraordinary contraptions in those days —but this particular plane and its pilot were even more extraordinary. Rodgers was out to startle the world by piloting a flying machine from coast-to-coast.

The minor fact that everyone said the feat was impossible didn't deter New York papers from giving Rodgers a headline-packed sendoff. The papers printed maps showing Rodgers' route across the city, and nearly everyone who had a roof was atop it, straining for a sight of the plane.

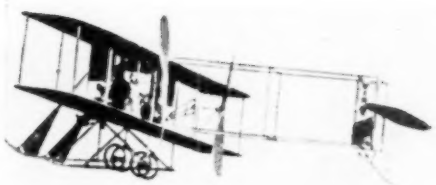
Airplanes were still an unknown quantity, and their fragile structure put them at the mercy of every stiff breeze. Airports were virtually non-existent.

But Publisher William Randolph Hearst (never a man to throw money around promiscuously) had offered



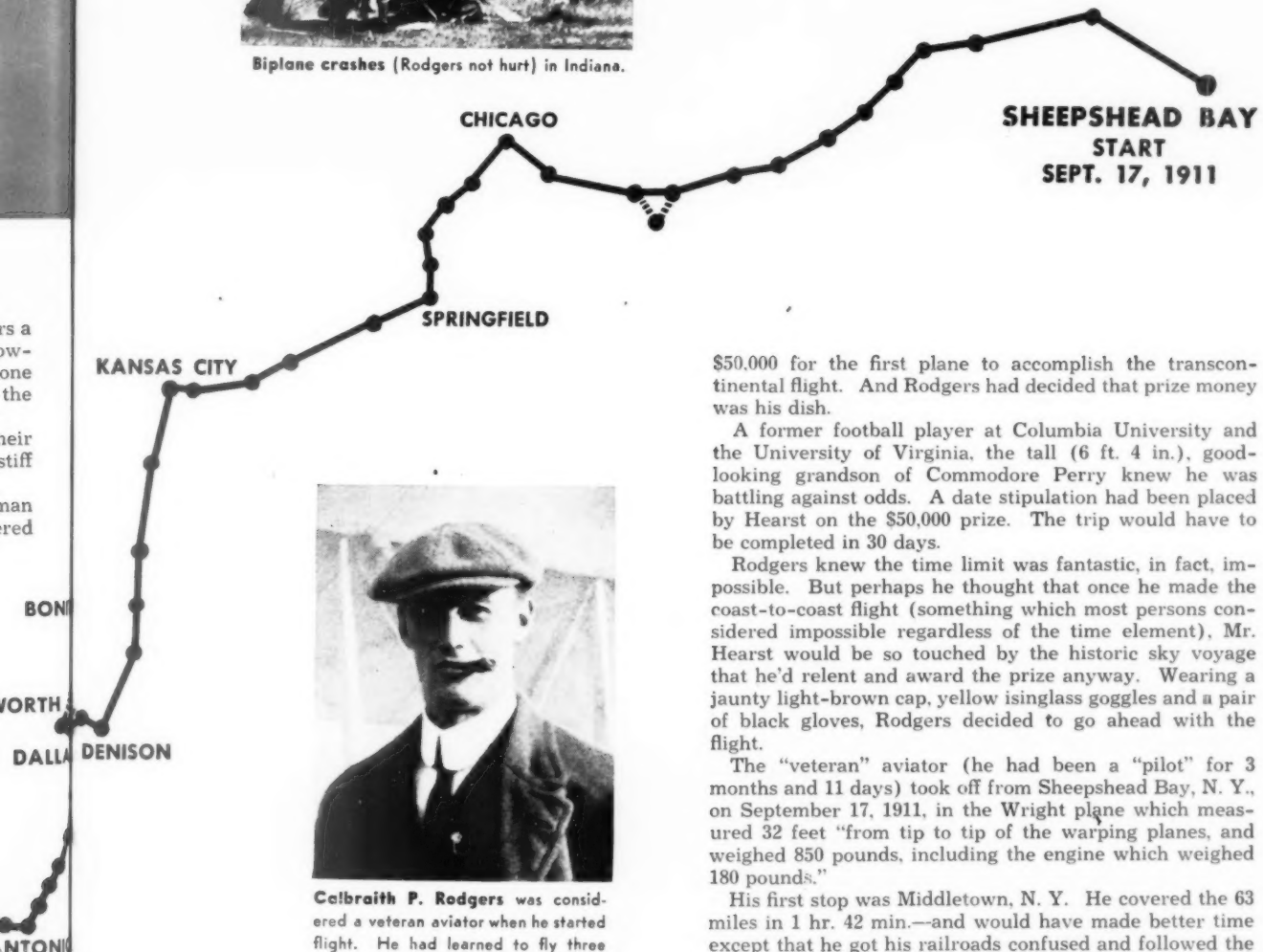
Flight ends in California when Rodgers lands on beach, taxis his plane to water's edge. Shortly afterward, he was killed in a crash.

Young Calbraith Rodgers startled the world in 1911 by flying from Atlantic to Pacific—in 49 days!



Rodgers starts his epic hop at Sheepshead Bay, N. Y.

Biplane crashes (Rodgers not hurt) in Indiana.



Calbraith P. Rodgers was considered a veteran aviator when he started flight. He had learned to fly three months previously at Wright School.

$50,000 for the first plane to accomplish the transcontinental flight. And Rodgers had decided that prize money was his dish.

A former football player at Columbia University and the University of Virginia, the tall (6 ft. 4 in.), good-looking grandson of Commodore Perry knew he was battling against odds. A date stipulation had been placed by Hearst on the $50,000 prize. The trip would have to be completed in 30 days.

Rodgers knew the time limit was fantastic, in fact, impossible. But perhaps he thought that once he made the coast-to-coast flight (something which most persons considered impossible regardless of the time element), Mr. Hearst would be so touched by the historic sky voyage that he'd relent and award the prize anyway. Wearing a jaunty light-brown cap, yellow isinglass goggles and a pair of black gloves, Rodgers decided to go ahead with the flight.

The "veteran" aviator (he had been a "pilot" for 3 months and 11 days) took off from Sheepshead Bay, N. Y., on September 17, 1911, in the Wright plane which measured 32 feet "from tip to tip of the warping planes, and weighed 850 pounds, including the engine which weighed 180 pounds."

His first stop was Middletown, N. Y. He covered the 63 miles in 1 hr. 42 min.—and would have made better time except that he got his railroads confused and followed the wrong set of tracks for a while. He smashed into a tree while attempting a landing, fell 75 feet, demolished the plane, and injured himself slightly.

This was a mild example of (*Continued on page* 71)

Air Guard pilots of 71st Wing, laden with parachutes, oxygen masks, cushions, "Mae Wests," and rubber dinghys, ride out to F-51s. After gunnery mission, line bus picks them and equipment up. Most ex-combat pilots were rusty on gunnery but soon got back into swing.

THE AIR GUARD GOES TO CAMP...

Hand-signalling crewmen guide pilot into parking area on crowded ramp. On ground, pilots can't see directly ahead in long-nosed, conventionally geared planes. Five squadrons were flying over 150 aircraft off same field at Air Guard maneuvers in Central Wisconsin.

World War II vets get back in harness for two week maneuvers.

By Capt. R. P. BOAL

ABOUT 300 YARDS down the south runway, a tightly-bunched cluster of wives and children waved wildly as our 24 F-51's streaked down two runways in two-plane elements and joined-up in formation overhead.

Then the women and the youngsters straggled back to parked automobiles and drove home while their pappys, members of the 109th Fighter Squadron, Minnesota Air National Guard, flew off to a two-week summer encampment.

We made a couple of circles over the Twin Cities to impress our neighbors and the taxpayers, then headed for Camp Williams, Wis., where we joined units from Iowa, Illinois and Missouri for two weeks of combined maneuvers.

The flight down to Williams was fun. Lieut. Col. John Dolny, our group commander, led the formation. I led the second flight; Karl Waldron, an 8th Air Force ace, led the third. Along behind us came the second section of 12 F-51's led by Maj. Bill Teare, C.O. of the 109th. After a couple of turns, Karl and I got used to each other on the cross-overs—and we figured the formation went very smoothly, for a bunch of civilians who were just getting back in harness.

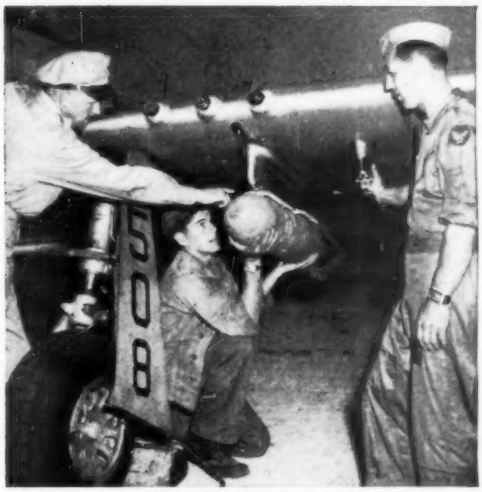
Even from the air, Camp Williams looked good. Set in low among the hills and grassy woodland of central Wisconsin it has concrete runways with beautifully clear approaches. When we checked in, we found the ramp was only two blocks from the tent area and the tents were two-man affairs with concrete floors. It was late summer, and the mosquitoes were still thick —but mosquito netting took care of that problem, most of the time. Sometimes the netting took a beating when the "witty" members of the outfit returned late at night from a rough session at a nearby inn and pulled the tents down or "slowrolled" the cots.

But occasionally the tables were turned. Late returners often found their beds anchored to tree branches, 10 or 15 feet off the ground.

The last F-51's of the 109th touched down at Camp Williams at 5 p.m.—and one hour later the mess hall opened for the first of 41 meals. Mess personnel had gone to camp a few days early to attend mess school. They learned their lessons well.

The entire 71st Wing was unpacked and organized by next morning, and we started operations early. I'd like to say that the boys, mostly wartime vets, eased into the routine immediately with nary a hitch. But it wasn't that easy.

The first week's flying was pretty snafu around the airport. The Air Guard was holding joint maneuvers (with outfits from different states) for the first time in history. At Williams, we had five squadrons flying over 150 aircraft off the same field. On several days, a plane took off or (*Continued on page* 67)



Practice bomb is attached to F-51 before simulated mission. Most air guard officers are combat vets.

Briefing sessions kept pilots up to date on progress and on missions to be flown by Guard aircraft.

Rounded training program kept some Guardsmen busy at one of military's traditional "glamor" jobs.

Confessions of a

"Honey, my eyes are failing," he screamed. "I can't read the sign!"

As Told to
MAGGI
SINGLETON

Here's a first-hand view of the airline pilot—as everybody doesn't see him!

"Signs of an impending physical exam are obvious—and awesome."

ONE member of the airline flight crew doesn't get much recognition. The Airline Wife may not wear a snappy uniform and yellow gloves but she does a lot of the work her husband gets credit for doing.

Take, for instance, the routine I like to call "Prelude to Operations 1." My Glamor Boy staggers into the house after a hard day over a hot golf club, sinks his weary frame into an easy chair and announces wistfully, "I gotta fly tomorrow, trip 425." This doesn't astonish me particularly. He has been home for three days: three glorious days in which he has done nothing more strenuous than raid the icebox every 20 minutes and whip off to the golf links every time I've mentioned that the shelves in the kitchen need repairing.

I say nothing.

"That goes out at 2:30 in the morning," he adds pathetically. He wants me to hold his hand and assure him that it is absolutely criminal for the airline to expect a man of his ability and seniority to trot out to the field at that ghastly hour just to earn some stinking old money. It's against the rules for me to point out that, with his ability and seniority, he could be flying any one of the daylight flights and that he bid 425 because it was over 50 per cent night-time; night flying does satisfying things to the pay check.

"I know, honey. Maybe we'd better have supper early tonight so you can get to bed and get some rest."

This is what he's been waiting for. "Yeah, guess you're right . . . I didn't get too much sleep last night."

I wonder if it's possible that 10 hours *isn't* enough sleep for a man of 32. The mood is established; we can relax now. Over the dinner table, the Man I Love suddenly has a horrible thought. "My God," he wails, with a start of alarm that wouldn't fool an idiot, "I've got a stack of transmittals that have to go into my Operations Manual before I go out. I forgot all about them . . . guess I won't get much sleep after all."

This is it. This is where we both take center stage and

Captain's Wife

"While I'm tummy-deep in transmittals for his Operations Manual, the Cap'n reclines in the living room for a strenuous evening."

CARTOONS BY DICK SHAW

play the big scene. I know all the lines by heart.

"I'll get your manual up to date, dear, you go on to bed. I don't have a thing to do tomorrow and I can sleep late." All I have to do is fix a man-sized meal about midnight, pack his suitcase so he won't forget to take an extra shirt in case he gets caught out on the line in bad weather, straighten up the mess he'll make galloping through the house in search of his flight gear and then get up at the crack of dawn because the man is coming to fix the furnace.

"Wouldn't think of it," he says manfully, "I'll do it myself. There's no reason you should bother. It's part of my job. Maybe it is dangerous for a man to fly when he's tired, but I'll have to take that chance."

All this chatter is mere formality. It will end up with the airline pilot sitting up to all hours to watch the fights on television, and the airline wife sitting in the next room, tummy-deep in discarded pages, trying to figure out why page 6000.01 is missing and why transmittal No. 392 has two copies of page 7000.04B—and three blank sheets.

Every once in a while someone on the airline decides that a pilot's pay is disproportionate to his services and they give him an extra task or two. They write an examination headed: "To Be Filled Out By All Flight Personnel." Some of these exams are chatty little questions on the equipment, some want to know all about the visual check points along the Company's routes, some are stern inquiries into the pilot's knowledge of the current Civil Air Regulations—and some are plain rot! And guess who knows all the answers? Yup, the Airline Wife. Ask me anything. I may not know what the situation in Europe is right now, I haven't the faintest notion what's playing on Broadway; but, brother, I can tell you down to the last drop how much gas is carried on a *Constellation* and what the restrictions are in letting down more than 50 feet after becoming contact. I'm convinced that the Boss knows the answers, too; but he isn't about to sit down with a pencil just because some gnome on the (*Continued on page 52*)

Hospitable Mapastepec Airport in Mexico is used by many lightplane pilots as an overnight stop to avoid excessive fees at Tapachula.

'The Bite' in Central America

By Lieut. Col. JOHN C. L. ADAMS

President, Adams Enterprises in Spanish America, S. A.

STAY AWAY from Central America unless you are mentally prepared for a kicking around!

That's my advice to lightplane pilots who think that it would be strictly glamorous to fly across Mexico or down across the Gulf to the exotic Central American Republics. It is true that the historic cities, the ancient ruins, the volcanoes and jungles, the picturesque Indian cultures are still there—all the color and romance still exist.

But either stay away, or pick your spots carefully if you would not find yourself frequently overcharged, needlessly harassed and contemptuously imposed upon. You will have no recourse from the stupidity and avarice of entirely too many Port-of-Entry or Exit officials. You'll endure and pay and like it—or else.

Central America's mountains and valleys are beautiful from the air, but author says flyers who make lightplane trips through the area will be overcharged and hounded by customs officials.

Motto of some Latin officials is: Why be difficult when it's so easy to be impossible?

Before I go any further, let me say that I live permanently in Central America, by my own choice, because I love the people and their customs and languages and countries. I am one of the family down here, but as an old Latin-American hand, heed these words of advice:

"Do not fly civilian personal planes for pleasure, vacations or personal business through Central America until the officials have put an end to the needless harassment that can be lumped under the good old Spanish word of *molestacion*—just pure downright ornery, aggravating molestation in its most vicious form."

Let me give you an example of the utter asininity of the manufactured handicaps and stupid operations of some of the unthinking officials you will have to deal with if you fly down here. A United States woman pilot recently landed at an airport of one of these countries as night was approaching. The Immigration official ordered her to leave immediately because her passport did not carry a visa. She had a flight authorization covering her plane but it did not mention her by name. Thus, with night approaching, she was ordered to leave when the nearest airports outside the country were about 200 miles distant.

I do not know what would have happened to a timid stranger, flying alone, but I happened to be on the airport and forbade her even to consider leaving. When the American Embassy and also a friendly secretary of the Minister of War were telephoned, the Immigration official's order was countermanded. Then it was decided that nothing more was really required of her since she was "Commander" of the airplane and her name was on the manifest as the "Captain-Pilot."

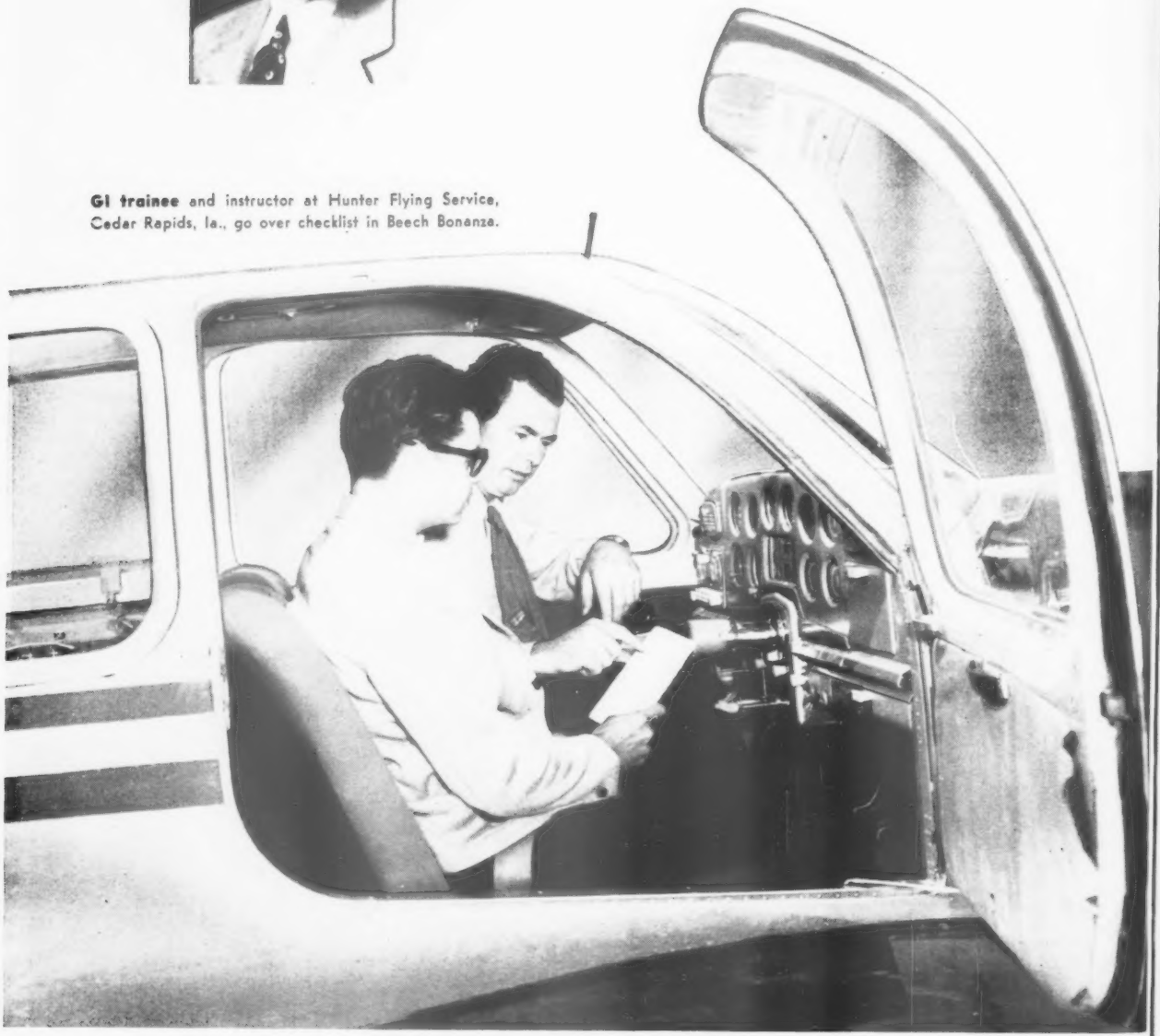
Yet that country has tourist cards for sale to any visitor desiring one and she could easily have been sold one on the spot by the airport official. Instead, he adopted that old motto: "Why be difficult when, with a little more effort, you can be simply impossible?"

Mexico has established a marvelously simplified and helpful system for speeding and helping personal plane owners and non-scheduled (*Continued on page 72*)

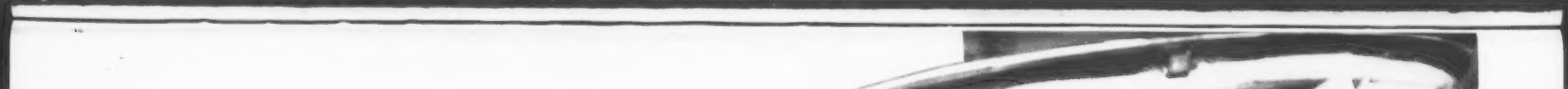
In Costa Rica, lightplane flyers find officials are cooperative and friendly. "The Bite," says Colonel Adams, is almost totally lacking there.

The GI Bill's "NEW LOOK"

By WAYNE WEISHAAR
Secretary, Aeronautical Training Society



GI trainee and instructor at Hunter Flying Service, Cedar Rapids, Ia., go over checklist in Beech Bonanza.



The GI flight training program is on a firm basis for the first time since the spring of 1948, thanks to recent Congressional action.

WHAT is the future of the G.I. Flight Training program?

If the question might be asked and answered purely on its merits, the answer would be "fairly good."

To clear the ground of any delusions that the author claims to have all the answers, let's look at the past, the present, and the future from the viewpoint of an interested Washington observer who has watched the program develop from the time of the passage of the Servicemen's Readjustment Act and one who has had close liaison with it in some 40-odd states.

Legislative history indicates clearly that it was the intent of Congress, when it passed the Servicemen's Readjustment Act, to provide the veteran a chance to attain some knowledge or skill which he presumably could have attained had it not been for his military service. It was not primarily intended to shunt GI's into formal colleges.

The Act was designed to give training as well as education. The GI's were getting older and many of them had neither the time, the money, nor the inclination to spend four or more sequestered years in some vine-clad institution of higher learning. Congress wisely assumed that men who were old enough to be called to risk their lives for their country and often to make decisions involving the lives of others, were mature enough to decide whether they wanted to study law, bricklaying, flight training, accounting, or whatnot.

From the outset of the training program there was widespread interest in GI flight instruction. Aviation was growing. Some of the men wanted to make aviation a career. More wished to use it as an adjunct of living and as a tool to help them earn a living. Youth rightfully looked ahead. More and more young servicemen asked for flight instruction.

Here are some figures which show graphically the number of veterans enrolled at various dates in flight training or related courses under Public Law 346, the Servicemen's Readjustment Act.

November 1, 1946	64,772
November 30, 1947	92,942
December 31, 1948	55,543

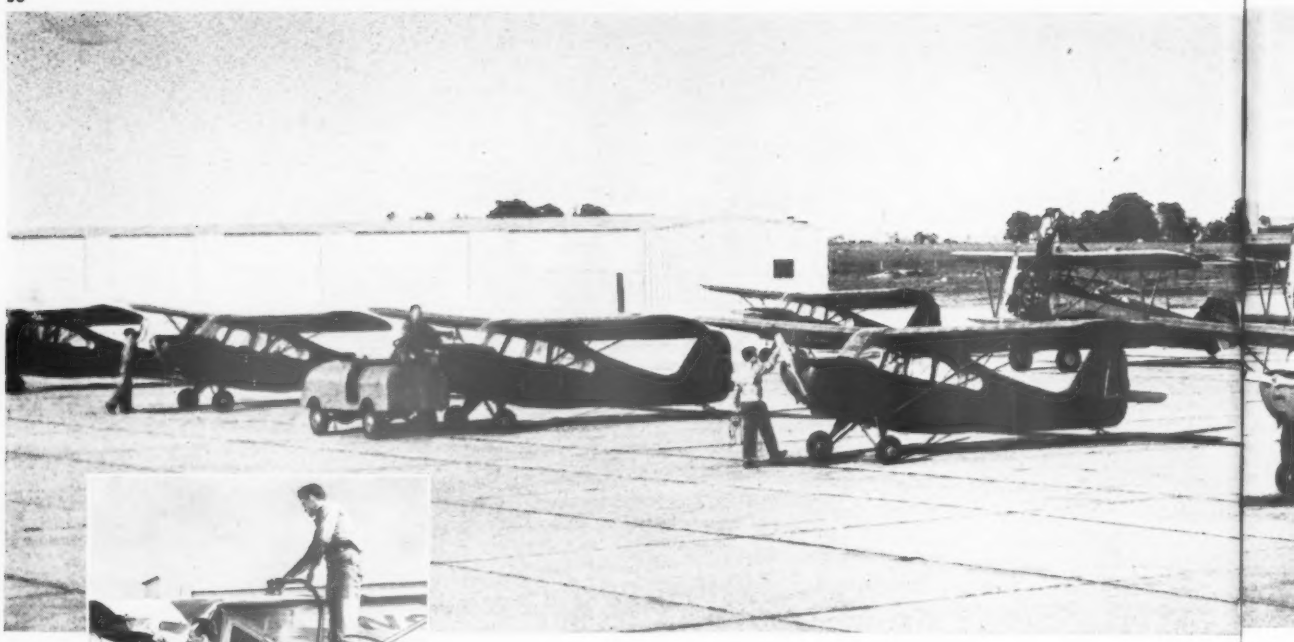
The above figures are significant because they emphasize what has happened in the GI flight program up to the present session of Congress. It will be noted that all of the above figures cover enrollments in late fall or early winter months, when flight training activities in many states are far below summer peaks.

Only a few people in the country realized how explosive the rate of flight training expansion had been in the country, or what its implications were. Few knew or cared that the number of Government-approved aviation schools had increased from just 19 in 1929 to 3,287 early in July, 1948. The nine members of the Aeronautical Training Society, who had owned or been managers of nine of those original 19 approved schools in 1929, knew the hopes and the hazards and the headaches implicit in such rapid expansion. So did a handful of well seasoned old timers in other groups who had stuck with the business since 1929, the first year that the Government agency which preceded CAA got around to designating approved aviation schools.

They sensed that while knowledge of flight instruction had improved from year to year, particularly during World War II, everyone of 3,000 schools could not be top-notch.

It was not the good old school nor the good new school, perhaps operated at a crossroads by an honest, sincere, qualified, young ex-serviceman that would cause trouble. It was the miniscule minority of promoters who yearned for a quick cleanup—the boys who had no yesterdays in aviation nor plans for tomorrow. This handful of unethical, high pressure operators battered CAA with demands for lower standards, (*Continued on page* 65)

Surplus planes like this BT-13 are used for instrument training by many schools certificated to give flight training under the GI Bill.



Flight costs covered by study included such items as first-rate service by linemen.

WHAT DOES IT COST TO FLY?

UNIVERSITY OF ILLINOIS LIGHT AIRCRAFT COSTS

Type	NC No.	Total Hours Flown	Fuel Cost per Hour		Oil Cost per Hour		Direct Maintenance per Hour	Overhead Cost per Hour *	Depreciation on Aircraft per Hour	Total Operating Costs per Hour
			Gallons	Cost	Quarts	Cost				
Cessna 140	2301V	542.2	5.46	$1.098	.223	$ .029	$1.05	$2.01	$1.00	$5.187
Cessna 140	2324V	608.0	5.44	1.098	.224	.029	1.14	2.01	1.00	5.277
Piper Supercruiser PA-12	4185M	447.1	5.31	1.067	.259	.034	1.08	2.01	2.00	6.191
Beech A35	752B	38.4	7.32	1.317	.365	.046	2.19	2.01	4.00	9.563
Beech A35	720B	117.6	9.72	2.042	.246	.032	.28	2.01	4.00	8.364
Beech 35	80460	343.2	9.00	1.921	.309	.041	3.81	2.01	4.00	11.782
Stinson 150	97692	455.8	8.72	1.612	.566	.074	3.28	2.01	3.00	9.976
Aeronca 7AC	82993	638.1	3.44	.632	.203	.025	2.24	2.01	1.00	5.907
Aeronca 7AC	82994	712.3	3.88	.722	.177	.023	.78	2.01	1.00	4.535
Aeronca 7AC	82995	685.7	3.60	.745	.212	.028	.93	2.01	1.00	4.713
Aeronca 7AC	82996	600.8	3.85	.708	.226	.029	2.91	2.01	1.00	6.657
Aeronca 7AC	82997	734.3	3.64	.671	.192	.026	1.21	2.01	1.00	4.917
Aeronca 7AC	83427	690.6	3.63	.671	.189	.025	.81	2.01	1.00	4.516
Aeronca 7AC	83428	678.0	3.57	.666	.205	.027	1.30	2.01	1.00	5.003
Aeronca 7AC	83429	634.0	3.73	.701	.197	.026	1.34	2.01	1.00	5.077
Aeronca 7AC	83430	728.0	3.61	.671	.212	.028	1.24	2.01	1.00	4.949
Aeronca 7AC	83431	587.6	3.56	.650	.184	.024	2.53	2.01	1.00	6.214
Aeronca 7AC	1536E	725.6	3.62	.676	.202	.026	1.57	2.01	1.00	5.282
Aeronca 7AC	1537E	531.5	3.98	.744	.188	.025	3.43	2.01	1.00	7.209
Aeronca 7AC	1538E	745.1	3.55	.673	.201	.027	1.41	2.01	1.00	5.120
Aeronca 7AC	1539E	875.0	3.59	.664	.201	.026	1.89	2.01	1.00	5.590
Aeronca 7AC	1540E	921.8	3.44	.637	.202	.027	.89	2.01	1.00	4.564
Aeronca 7AC	1541E	700.8	3.83	.715	.233	.030	2.28	2.01	1.00	6.035
Cessna 120	89546	640.0	3.61	.657	.216	.028	1.28	2.01	1.00	4.975
Cessna 120	89623	590.5	3.46	.600	.207	.027	1.06	2.01	1.00	4.697
Ercoupe 415-C	86979	238.3	3.31	.660	.193	.025	3.44	2.01	2.00	8.135
Ercoupe 415-C	99272	255.3	3.83	.685	.267	.035	4.22	2.01	2.00	8.950
Seabee RC-3	6717K	24.0	17.10	2.977	.333	.043	2.70	2.01	3.00	10.730
Boeing A75N1	51443	442.1	11.05	1.989	.659	.085	1.41	2.01	4.00	9.494
Boeing A75N1	57843	431.6	10.69	1.923	.771	.100	1.06	2.01	4.00	9.093
Boeing A75N1	64078	129.1	12.09	2.192	1.140	.148	3.66	2.01	4.00	12.010
Taylorcraft BC-65	27460	105.7	3.06	.547	.170	.022	1.70	2.01	1.00	5.279

* Identical overhead costs were assigned to all airplanes as follows: Shop overhead maintenance, $1.14; Depreciation on shop equipment, 16 cents; Insurance damage, 8 cents; Public liability insurance, 9 cents; Linemen's salaries, 54 cents; Total $2.01

University of Illinois keeps records on fleet of 32 personal planes, including 16 Aeroncas (some in foreground) used in flight instruction.

Illinois study gives complete picture of lightplane costs

THE September issue of FLYING tells the sad story of a novice pilot who bought a second-hand Stinson *Voyager*, 1947 model, with 800 (admitted) hours. Before he sold it he had flown it for a total of 18 hours of dual and 7½ hours of solo at a total cost of about $2,000. It doesn't take much of a mathematician to figure out that this plane cost its owner approximately $78.43 per hour.

Such stories give all private flying a black eye, and it doesn't help the matter to know that the case is hardly typical and that the pilot was taken in by an unscrupulous operator who sold him an airplane with a ruined engine. It is the continued retelling of such yarns that makes many prospective plane owners shy away from buying new planes.

But what can a prospective owner figure on? How much can he expect to pay? And what cost figures should a present owner refer to to see whether his own expenses are in line?

The answers, strangely enough, are few and far between. The only way to find out how much it costs to own a plane is to keep actual cost records of a number of them and average them out. Estimates aren't very dependable. The manufacturers have their estimates and they are often unrealistic. The CAA likewise makes calculations which are only an approximation of the truth. A few individual owners keep careful records but they are all prepared on a different basis and are impossible to average out. Few fixed base operators keep useful cost records.

The University of Illinois has recently published a booklet, "Light Aircraft Operating Costs," which gives detailed cost data on 32 planes which are operated by the Institute of Aviation under Dr. Leslie A. Bryan. The planes are flown in routine student flight training and for the transportation of University faculty and staff members on business. The records cover a period of 11 months and a total of 16,598.1 hours of flight time. Furthermore, they are kept in the best accounting methods.

The study does not cover enough aircraft of each type or make to warrant a fair comparison between them, but from an overall standpoint, Dr. Bryan's carefully compiled costs probably are the best things of their kind that have ever come along. In studying them, however, the reader should remember always that except in the case of one make, the costs for any individual model may not give a true average picture because of the inadequacy of the sample.

The Illinois costs cover two Cessna 140's, a Piper *Supercruiser*, three Beech *Bonanzas* (two A-35's and one 35), one Stinson 150, 16 Aeronca 7AC's, two Cessna 120's, two *Ercoupe* 415C's, one *Seabee* RC-3, three Boeing A75N1's (*Kaydets*), and one Taylorcraft BC-65.

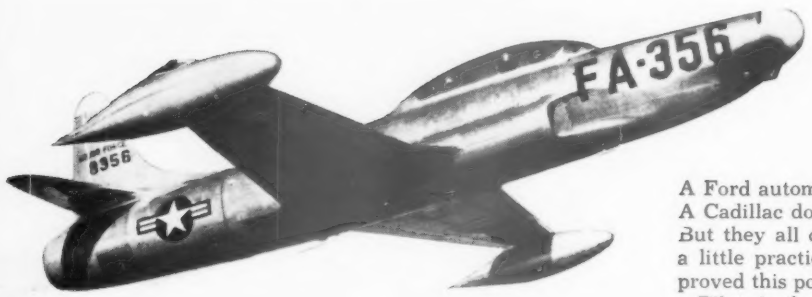
These planes were flown from a minimum of 24 hours for the *Seabee* to a maximum of 921.8 hours for one of the Aeroncas. It cost the University $10.73 per hour to fly the *Seabee*, compared with $4.516 per hour for Aeronca 83427.

Only in the case of the Aeroncas is the sample large enough to arrive at average cost figures which would have fairly universal application. For this reason, a detailed analysis of the Aeronca costs is of tremendous interest to all lightplane pilots and owners.

The 16 Aeroncas were used heavily. They flew a total of 11,189.2 hours during the 11-month period. The minimum time put on any Aeronca was 531.5 hours and the maximum was 921.8 hours.

The cost of gasoline in flying them averaged 68.3 cents per hour of flight. The cost of oil averaged 2.6 cents per hour. The cost of materials for maintenance was 85.5 cents per hour and for labor was 75.5 cents per hour—a total of $1.61 for direct maintenance per flight hour. The direct flight costs for flying these 16 Aeroncas a total of 11,189.2 hours therefore was (*Continued on page* 77)

You CAN Fly it!



By BEN ROBIN

It doesn't take Supermen to fly 'hot' aircraft. You can do it with a little training.

Lightplanes and jets operate on the same principles. Both can be handled by a competent pilot with a little practice.

FOR YEARS I have listened to a minority group of veteran pilots scare off potential customers and fledgling pilots with—"Wait until you try a twin-fuselaged Monongahela Special. Not everyone can fly that hot ship. It's a ground looper, too."

To all talk about hot ships, ground loopers, bad spinners and the like, I say, "If the other guy can fly 'em, so can you."

The next time a pilot tells you how hard some plane is to fly, take a good look at him. He has just two arms, two legs, and a pair of eyes like your own, hasn't he? There was a time when he was a beginner. Now he's flying this Super Duper Hot Job, isn't he? So can you. Don't feel bad either the next time some one refers to you as a *Cub* pilot. Did you know that immediately following World War II, many commercial airport operators had to turn down Army pilots who wanted to rent their lightplanes? The rating limitation on these ex-Army pilots' commercial tickets often read single and multi-engine, land or sea.

There is just one answer. *Cubs* are not harder to fly than B-29's. Neither are DC-3's harder to fly than twin-engined Cessnas. Each plane you fly will have little peculiarities that make it handle a little unlike any other model. A Ford automobile handles different from a Mack Truck. A Cadillac does not drive like an Austin in heavy traffic. But they all can be handled by a competent driver with a little practice. I believe the Air Transport Command proved this point during World War II.

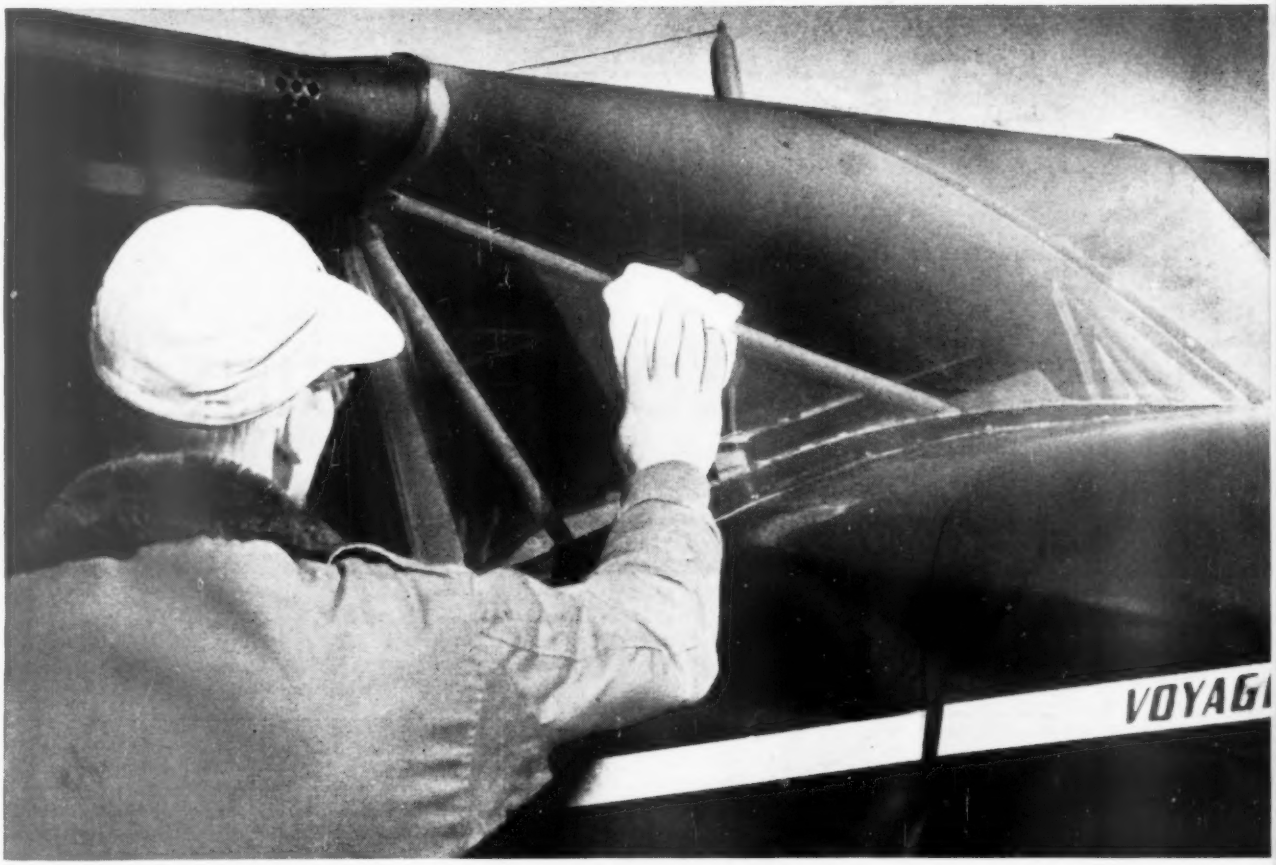
Pilots in the ferrying division of the Air Transport Command delivered every type of plane the AAF used. At the outbreak of hostilities, the ATC had at its disposal only a handful of pilots. These officers, Army flying school graduates, had to train a bunch of civilians to help ferry Army aircraft. I was one of those civilians. Two years later, I became director of training at the New Castle Army Air Base near Wilmington, Del. This transformation enabled me to see from both sides of the fence.

In 1942 I heard Army-trained lieutenants tell civilian pilot applicants that AT-6's were hot planes. They told them about vicious ground loops. But the boys stepped in and flew the AT-6's and Martin B-26's, too. The B-26's landed at about 130 m.p.h.

In 1943 the situation was reversed. The civilian pilots, already commissioned, were successfully flying and delivering pursuits, bombers, trainers, everything the factories had to offer. New aviation cadets were graduated from advanced Army training schools and assigned to the Air Transport Command. The same old superman stories flew all over the base.

The egotistical old time pilot likes to boast about several pet topics. A fast landing plane seems to be one of his favorites. I have made over 100 landings in the Martin B-26 twin-engined bomber. The models I flew were the B-26, B-26A and B-26B. Later, a longer wing (and slower landing) model came out, but the planes I flew stalled and were through flying at 130 m.p.h. A minimum safe speed over the edge of the runway was 150 m.p.h. I can honestly say that the B-26 landed easier than a J-3 *Cub* trainer. Equipped with tricycle gear, all that was necessary for a real grease job was a long runway. Any plane that kisses the cement at 130 m.p.h. is going to need 4,000 feet, or better, for a moderately braked stop. I have never seen a really bad landing in a B-26, but I have seen experienced pilots bounce like a yo-yo in a *Cub*.

The reason is simple. A pilot flying a fast landing plane uses only first class concrete runways. He also is aware that the slightest mishap could mean disaster at speeds in excess of 100 m.p.h. and proceeds (*Continued on page* 61)



Careless cleaning of plastic windshields can damage surface. Mechanic (above) uses dry cloth which causes network of tiny dust scratches.

Care and Cleaning of WINDSHIELDS . . .

By M.C. ANDERSON and J.W. ROCKE

THE NEXT TIME you see a cracked, discolored, "crazed" plastic windshield, take a second look at the plane's owner. He's a guy who doesn't know some elementary facts that can save money—and add to his own safety.

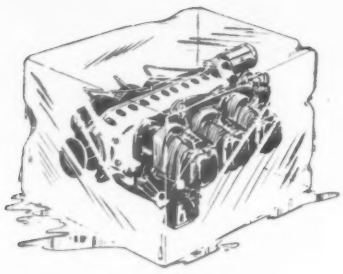
Those water-clear, flexible, shatterproof plastic cockpit enclosures are ideal for lightplanes. But they're soft. They scratch easily. They become yellow and "craze" with age.

Despite all this, they give long and satisfactory service with even a minimum of care.

Most important factor in care of plastic windshields is the technique used in cleaning them. A simple operation, cleaning is probably responsible for more windshield replacements than any other factor. It's as easy to do the job right as to do it wrong, but many mechanics—and some owners—just can't be bothered.

Never wipe the surface while it is dry. Dust particles will scratch the surface, and eventually those minute scratches will multiply until the surface is crisscrossed by a lacy web of tiny lines. These surface scratches reduce visibility, and when landing against the sun or taxiing in the glare of lights the windshield becomes nearly opaque. At times like these, poor vision can cost you your life! (*Continued on page* 79)

Sun reflection on "crazed" windshield makes plastic almost opaque. "Crazing" can be caused by strong cleaning fluids.



HOW TO BABY YOUR ENGINE

No. 3 Altitude, Temperature and Engine Icing

By PETER ALTMAN

ENGINE EXPERT

In this last of three articles, Aeronautical Engineer Peter Altman discusses the effects of the atmosphere on engine operation. Vice-president of Continental Motors, Altman was director of Aeronautical Engineering Department, University of Detroit, from 1925 to 1940, and was head of the Manufacturing Research Division of Convair from 1940 to 1943.

ALL ENGINE and airplane performance data are based on an assumed set of standard conditions which consider the atmosphere at sea level, at a temperature of 60° F. and a barometer pressure of 29.92 inches of Hg. Variations from these values, whether due to natural ground altitude or atmospheric conditions, will affect the performance. This may be higher or lower depending on the magnitude of the change.

The operator must give these conditions consideration especially when the airplanes are heavily loaded in comparison with the power available. Conditions of high outside air temperature, high ground altitude or a combination of both are particularly important in this regard because they reduce the useful power available.

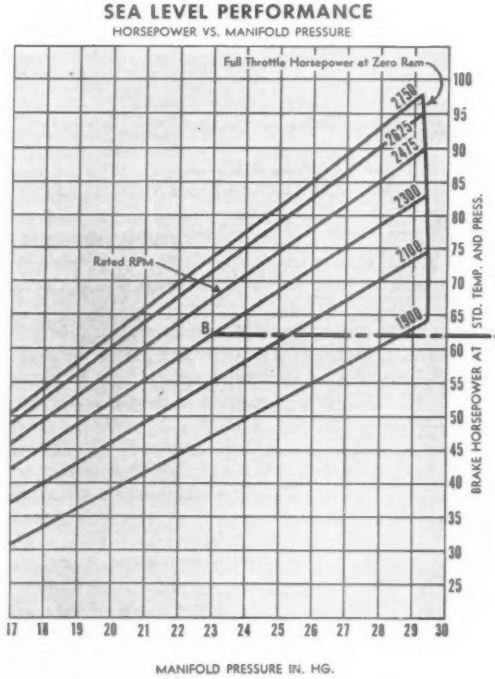
Carburetor heat also reduces the engine power and must be used with caution whenever the full power of the engine is required.

Performance at Altitude

The speed of an airplane in level flight for a given amount of power delivered to the propeller increases as the altitude is increased. For most airplanes in the normal range of altitude the speed increases approximately one per cent for each 1,000-foot increase in altitude based on constant power output of the engine up to the critical altitude.

●To attain this increase in speed in the non-supercharged engine it is necessary to increase the throttle opening continually to maintain a constant amount of power delivered to the propeller. This can be continued until the full throttle condition is obtained and represents the critical altitude. Additional increase in altitude beyond this point will result in a decrease in speed.

For an airplane equipped with fixed pitch propeller, the engine speed will increase as the throttle is opened to maintain constant power. For the controllable pitch propeller a combination of change in propeller pitch and



Sea level power varies with manifold pressure.

engine speed is used in order to obtain the best operating conditions.

Because airplanes equipped with controllable pitch propellers usually have a manifold pressure gauge, many operators prefer to fly at constant manifold pressure with change in altitude. This is easy to attain and results in an even greater increase in speed with increase in altitude than is available with constant power operation.

Characteristics of the engine at altitude can be studied by reference to the conventional power charts supplied by the manufacturer. A sample chart is shown on these pages. The left-hand side of the chart represents the sea level performance characteristics of the engine and the right-hand side shows the altitude performance.

These charts usually include instructions to enable the operator to compute the sea level and altitude power characteristics as shown in the upper left-hand corner. The example selected in this chart assumes level flight operation at sea level at Point B representing manifold pressure of 23 inches Hg, engine speed of 2300 r.p.m. and power available at the propeller of 62 h.p. If the engine is operated at the same manifold pressure and r.p.m. with change in altitude it will develop 65 h.p. at 7,000 feet density altitude as shown by Point B.

Power available at intermediate altitudes can be obtained from the line C-A. Point D represents one of these intermediate points at 4,000 feet density altitude at which the power available is 63.5 h.p. The increase in power with altitude under this condition is due to the decrease in exhaust back pressure while the manifold or induction pressure remains constant.

Since Point A represents a greater amount of power available for cruising flight at 7,000 feet than was available at sea level, and because the power required for level flight in the normal operating range decreases with altitude, this will result in an increase in speed which is in proportion to these two effects.

Line C-E on the altitude performance chart represents the power available with change in altitude based on constant power operation. This is less than is available at a constant manifold pressure and therefore will result in a smaller increase of speed as previously discussed.

Temperature and Propeller Ground Speed

The engine ground speed for a given propeller pitch setting varies with the outside air temperature. This change in ground speed is subject to much discussion between pilots and mechanics and the conditions producing it are many times misunderstood.

There is no mystery about this condition and it is not due to any malfunctioning of the engine or propeller as is usually assumed. It occurs because the power developed by the engine and the power required to rotate a propeller of given pitch, at a given speed, vary at a different rate with change in temperature. Assuming constant barometric pressure the power developed by the engine varies as the square root of the absolute temperature, whereas the power required to rotate the propeller is in direct proportion to the temperature.

Consequently, when the temperature decreases, the power required by the propeller for a given speed increases at a greater rate than the increase in the power developed by the engine. If the temperature should change from 90° to 70° at the same barometric pressure, the power required by the propeller would increase approximately four per cent while the engine power would only increase two per cent. Propeller speed therefore decreases until the condition of equilibrium is reached.

Usually only a small change in engine speed is required for the two values to equalize because the power required by the propeller varies rapidly with speed (power $\propto$ (r.p.m.)^3) and the engine power is almost a direct function of speed (power $\propto$ r.p.m.). In the example the decrease in speed would be about 50 r.p.m. Larger changes in temperatures would result in greater changes in speed.

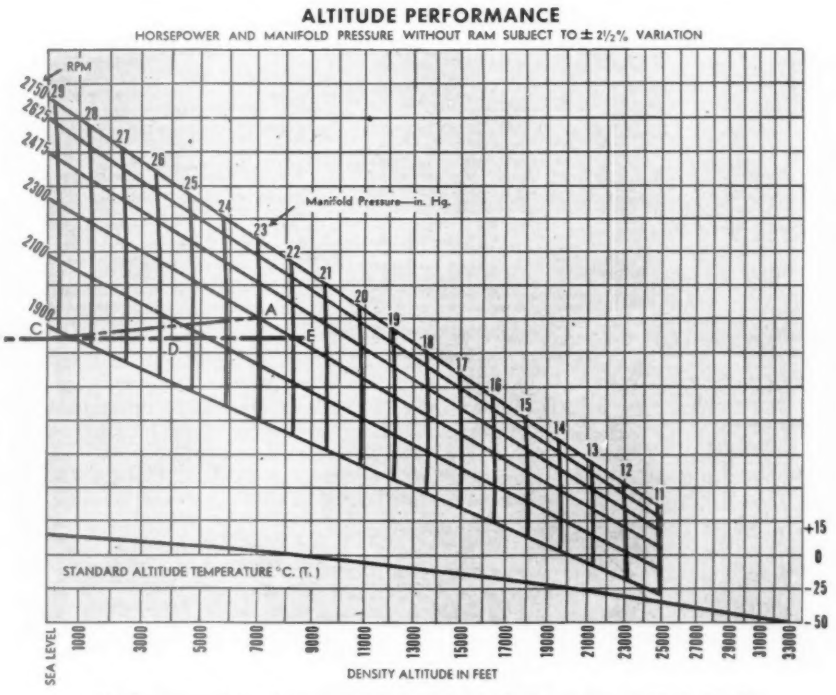
Carburetor Icing

Undoubtedly, the most important and direct effect a pilot can observe on his engine from the atmosphere is carburetor ice. Ice formation in the carburetor and induction system is responsible for a large number of forced landings and for many serious accidents. There are many ways to prevent icing in the carburetor, but the one most frequently used in personal planes is air heated through an exchanger.

The proper use of carburetor heat is not too difficult to learn. It is only necessary to follow well established rules and to learn to judge the atmospheric conditions.

There are three indications of icing and the pilot should understand them and understand also that they are not invariable checks. The following information is from CAB Safety Bulletin No. 148, "Carburetor and Induction Icing," by Fred G. Powell.

"A. Loss of Power. Icing of any part of the carburetor air scoop, induction system or the metering elements of the carburetor will interfere with the correct fuel-air ratio and loss of power will result. Any icing restriction in the mixture induction system will cause a loss of power and not necessarily a change in the fuel-air ratio. The indication of this power loss differs with (*Continued on page* 57)



Airplane speed for given power increases with altitude up to the critical altitude.

REPORT FROM
WASHINGTON

Despite ban on feuding, Navy carries its story to Capitol Hill.

Navy Battles to Get Back on First Team

By RICHARD SAUNDERS

Washington Editor of FLYING

AFTER CAREFULLY probing into the B-36 procurement controversy, the House Armed Services Committee discovered a toy pistol instead of a bombshell.

There wasn't even a pop in the toy pistol—not the slightest trace of irregularities or favoritism in the way the Air Force had gone about ordering the big bomber.

With commendable dispatch, the committee promptly gave the Air Force a clean bill of health in the matter. Its official statement completely exonerated Secretary Symington and other high Air Force officials of all charges of wrong-doing in their handling of the purchasing program.

Neither the committee nor uneasy Pentagon officials believe, however, that all charges and counter-charges concerning military strategy will turn out to be such harmless duds. Several sizzlers have bounced right into the committee room. They may go off any minute.

The committee undoubtedly knew the "ugly rumors" of B-36 contract manipulations were just a side issue.

"Hot Potato" Is Division of Responsibility

The real hot potato is, and always has been, the division of responsibility between the Air Force and Navy. If the Air Force concept of strategic bombing prevails, the Navy believes it will be relegated to the second team. And merger or no merger, the Navy won't give in without a fight. Since it has not found a sympathetic ear in the new consolidated Department of Defense under Secretary Johnson, it is trying to carry its case to the only court of appeals left open to it—Capitol Hill.

Spokesman for dissident Navy elements, Capt. John Crommelin charges present policies are ruining Navy.

Despite Johnson's tight ban on public feuding by the armed services, several high-ranking Naval officers have reached the point where they can contain themselves no longer. Recently Capt. John Crommelin, a Pacific war veteran who was air officer on the Carrier *Enterprise*, lashed out against policies he believes are scuttling the Navy.

Though he was working under the Joint Chiefs of Staff, Crommelin decided the time had come for plain talking even if meant he was "tossing his career overboard." He said the Navy's fighting spirit was going to pot because of the way the service is being kicked around. He also spoke darkly of top-level plans that would trim the wings of Naval aviation and gradually shift what was left over to the Air Force. "This is happening just at the time the country needs the Navy more than ever," he raged.

Hardly had he issued his blast before he began receiving congratulatory pats on the back from some of his brother officers. If they did not endorse everything he said, they nevertheless applauded his spirit in speaking out for the Navy. Retired Adm. W. B. "Bull" Halsey, who helped write Naval air history with his famous Pacific task force, said that he stood behind him. Rear Adm. Austin Doyle, head of the Naval Air Reserve Training program, said a Naval airman of Crommelin's prominence could not be "off the line." Even so, the Defense High Command may lop off Crommelin's official neck for the brash act. It had cracked down with prompt disciplinary action in the case of Cedric Worth, assistant to Undersecretary of the Navy Dan Kimball. When Worth was unmasked as the author of the anonymous document circulated on Capitol Hill attacking the B-36 program, he was immediately suspended.

But no thunderbolt from the loftiest offices of the Pentagon would prevent Congress from looking into Crommelin's charges. And this was precisely what Crommelin had in mind when he spoke his piece. He said he wanted to blow the whole thing open so that inquisitive legislative eyes could see the whole picture.

Already several members of the House Armed Services Committee have expressed an interest in widening their probe to cover the points raised by Crommelin.

Answer Lies in Appropriation Bills

It all boils down to a battle for funds. The ultimate decision will lie in appropriation bills—not in the antics of inquiry boards or the reports of investigating committees. Naturally the findings of investigating committees have a bearing on appropriations. But they have to be of world-shaking importance to count.

As matters now stand, neither Air Force nor Navy thinks it is getting enough money. The Army doesn't even try to get as big a cut as the other two; it does not have to concentrate on expensive equipment to the same extent. The Air Force has come off much better than the Navy, however. Congress, or at least the House, made an effort to restore part of the money cut from the Air Force budget by the White House.

Air-minded men in the House were trying to hasten the Air Force on its way toward the official goal of 70 air groups by 1952. The outcome of this fight is still uncertain. But no effort was made on either side of the Capitol to put back funds the President cut from Naval appropriation requests.

Thus it looks as though the Naval air program will be 843 planes next year while the Air Force will be able to place orders for from 1,668 to 2,550 depending on the final decision as to whether Congress will restore the Air Force budget cut of $800,000,000.

If they were not too happy about the present military budget of around $15,000,000,000, (*Continued on page* 78)

HAVE YOU SEEN?

New Martin XB-51 has sharply sweptback wings, tandem landing gear and unusual "T"-shaped control surfaces. Bomber will carry a two-man crew.

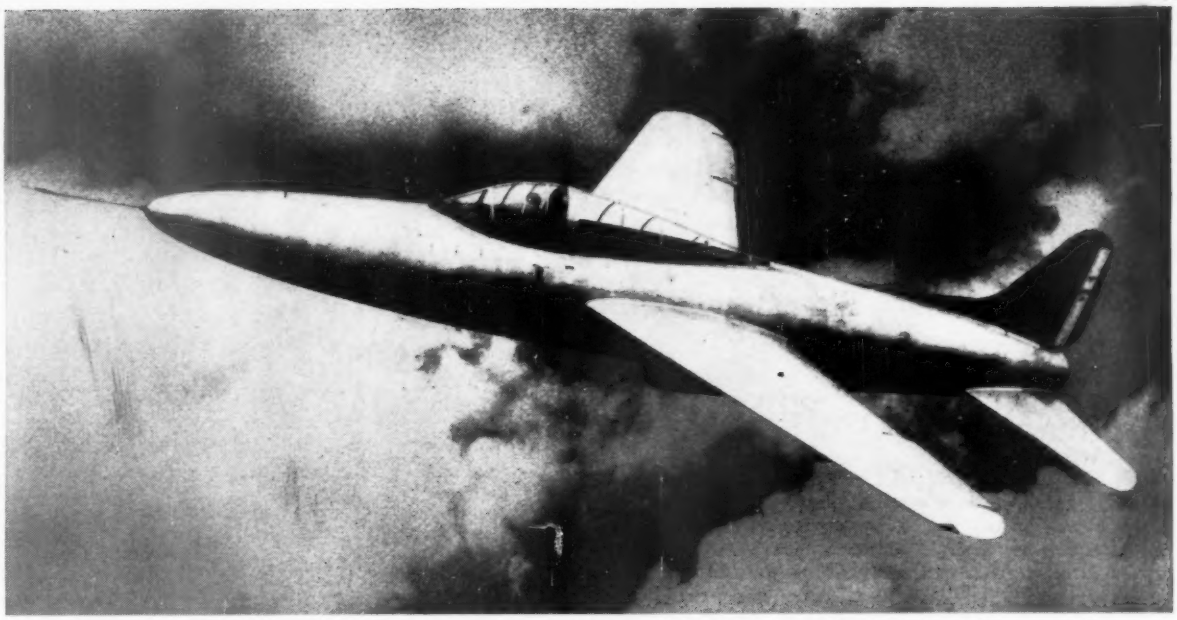
Three-jet bomber, the XB-51 is a high-speed ground-support plane. Sweepback in wings is 35 degrees. Wingspan is approximately 55 feet; overall length is about 80 feet. Two of the engines can be seen, mounted on pylons on side of fuselage. Third is in rear of fuselage.

Karhu 48 is four-place Finnish craft adaptable as land, sea plane or ski plane. Karhu has Lycoming 190-h.p. engine with Aeromatic propeller. Span is 37.85 feet, top speed 142 m.p.h., cruising 116 m.p.h., range 435 miles. Wings are wood, fuselage fabric-covered.

SAI-Ambrosini S. 1001 (Grifo) is Italian wooden four-placer with fixed gear. Plane recently made 24-hour non-stop flight.

Brewster F2A-1 is one of fighters sold to Finland in 1939-40. Ski-plane modification was still flying there last winter.

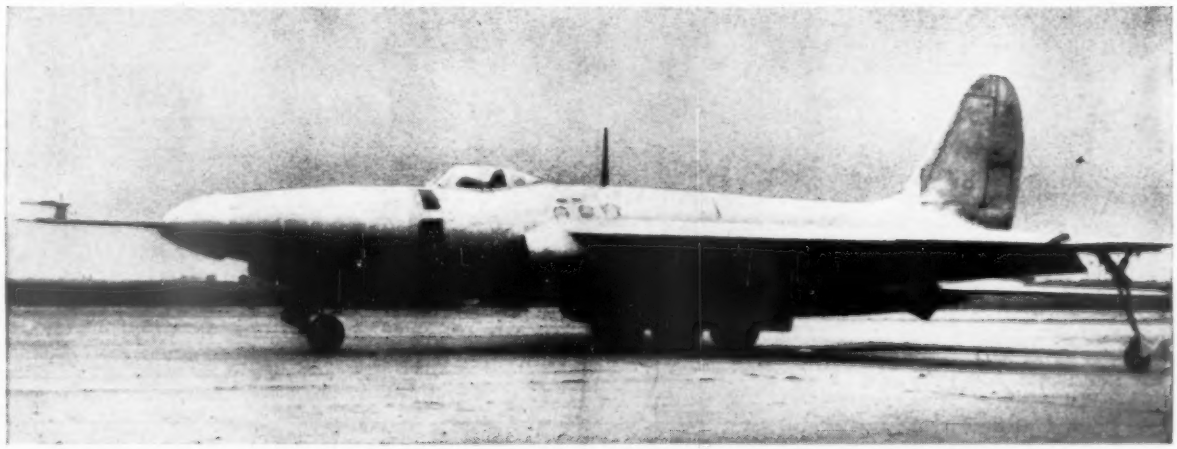
Czech Kovo Mraz M. 1D Sokol is three-place wooden plane with Walter Minor 105-h.p. engine. It cruises 132 m.p.h., has 625-mile range. Top speed is 150 m.p.h. Craft has 32 ft. 9 in. span, an empty weight of 897 pounds, and a gross weight of 1,707 pounds.



Sud-Ouest Espadon is one new group of French experimental jet warplanes which are in development. Espadon is powered by a 5,000-pound static thrust Hispano-built Nene jet engine. Its maximum speed is reported to be in the neighborhood of 650 m.p.h.

Sud-Ouest Triton is French-built two-place jet trainer. Like Espadon, the Triton is powered by Hispano-built Nene engine.

Sud-Ouest Norval is a shipboard pusher fighter powered by an Arsenal-built 2,250-h.p. Jumo. Maximum speed is 455 m.p.h.



Sud-Ouest M2 is experimental flying jet model for a large French jet bomber. It is powered by a Rolls-Royce Derwent V. Like some U.S. jets, M2 has tandem main wheels and outrigger gear on wings. Full-size bomber, grossing 57,000 pounds, nears completion.

I Learned About Flying From That! NO. 120

Noted glider pilot overlooks five rules for planning successful soaring flight.

By WILLIAM G. BRIEGLEB

Author has flown gliders for 20 years. He is head of Briegleb Aircraft Company at El Mirage Field in Adelanto, Calif.

FOR SEVERAL MONTHS I had been waiting for good cross-country soaring weather, the kind of weather that would warrant an attempt for soaring's coveted Golden "C" award. The Golden "C" certificate and pin are the highest prizes in international soaring, requiring a five-hour duration flight, 186.42 miles (airline distance) and an altitude of 9,843 feet above low point. All flights must be solo, and not more than two "legs" on one flight may be counted.

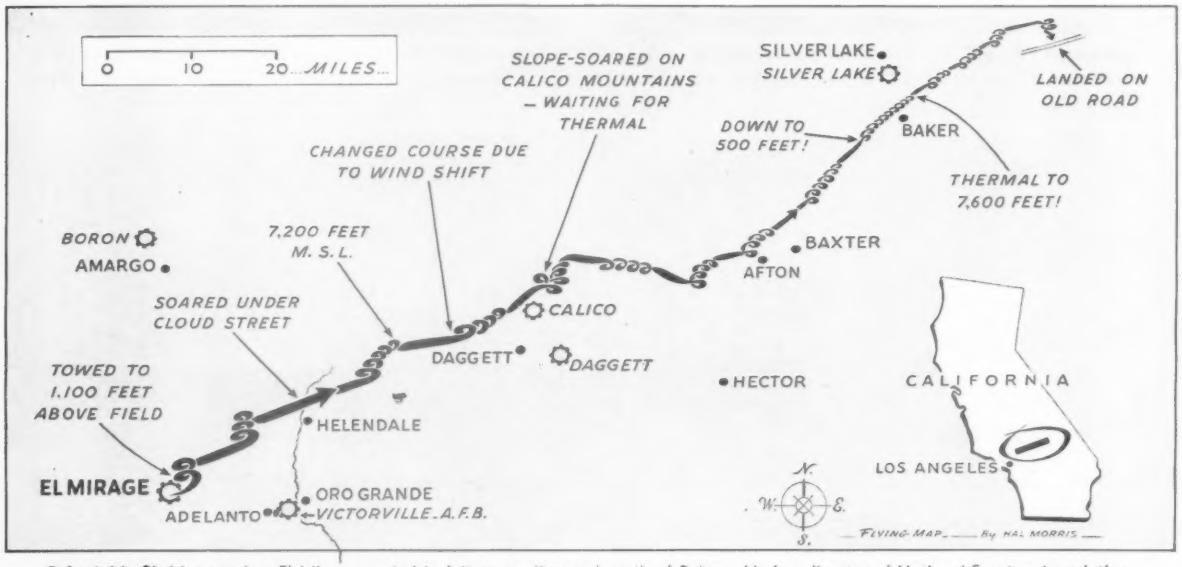
I had completed my altitude requirements in August—and had made several flights of the required distance, but always with a passenger.

By October, I had everything ready for the official try. For this type of distance attempt, a glider pilot has to consider a number of important items. He has to decide on several possible routes in case of wind shifts along the way. If the glider is to be retrieved via airplane tow, a sufficient number of good landing spots must be selected along the route. Proper clothing must be worn, since sailplanes are usually without heating units. A tiedown kit with flares is a must, as is a signalling mirror. Food and water must be packed, because in flights out of El Mirage Airport in California we soar across desert regions.

On October 29, Thayer Smith and I noted that the weather was apparently suitable for a cross-country attempt. At 10:30 that morning, Smitty warmed up the BT-13 and towed me to 1,100 feet above El Mirage Field, where we encountered a small area of lift. Assuming this condition would improve, I cut loose from the towplane and to my dismay discovered the lift was of the "bubble" variety which soon vanished.

Struggling between 800 and 2,000 feet above the ground for about 25 minutes, I finally encountered lift of five feet per second and climbed to 4,300 feet (M.S.L.).

Heading for a cloud street which drifted toward Daggett, Calif., we (the BG-8 and I) (*Continued on page* 50)



Briegleb's flight started at El Mirage, ended in failure on dirt road north of Baker. He is a director of National Soaring Association.

PLANE FAX

A page of service tips for private flyers and fixed-base operators

How Glendale's Sky Roamers reduced engine maintenance cost 53%

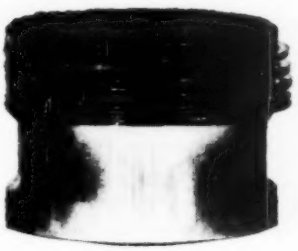
Recently, the Sky Roamers Flying Club of Glendale, California, sent the engine of their Continental 85 Powered Cessna 140 to the shop—*after 1005½ hours service without repair*—for a checkup.

"It was still running quietly, had no stuck rings or valves and was using only one quart of RPM Aviation Oil in eight hours," is the astonishing report of Mr. James H. Brown, secretary-treasurer of the club.

"Our previous Continental 85 engine, using two other aviation oils, stuck rings three times in 798 hours. Engine maintenance cost was $.535 per hour.

ENGINE: CONTINENTAL 85 hp
OIL USED: "R P M"

Ring belt area free of deposit after 1005½ hours —

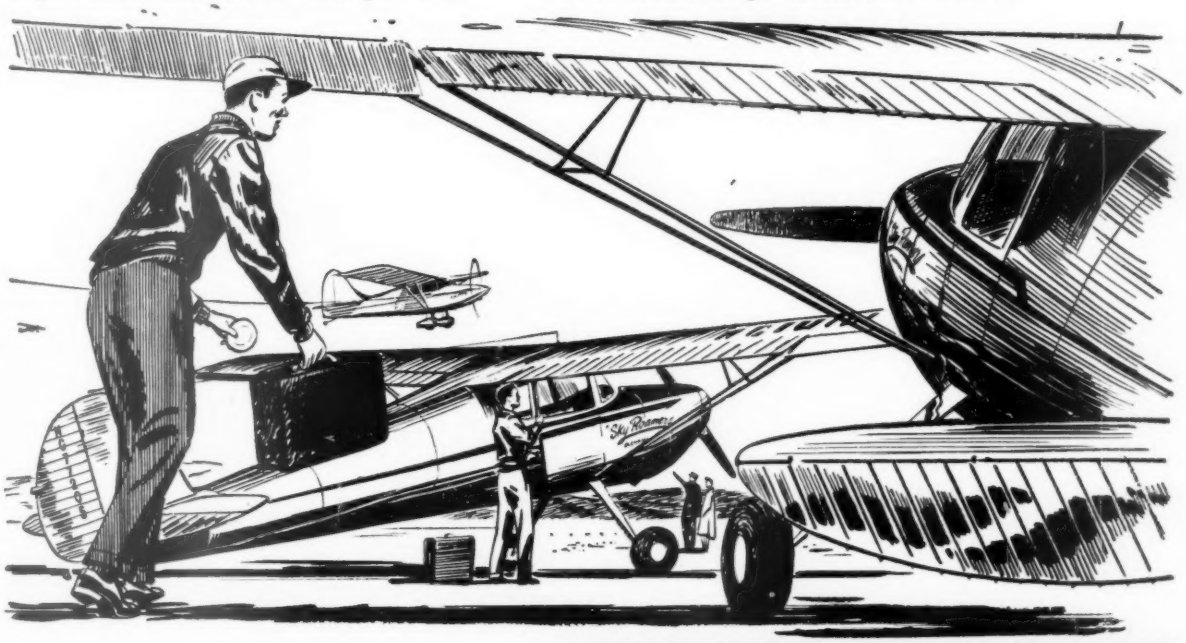


Ran four times longer than the longest run using other oils —

—Prevention of stuck rings and valves gives maximum service at $.248 per hr.

"Using RPM Aviation Oil, with no ring or valve jobs," concludes Mr. Brown, "reduced cost to $.248 per hour."

REMARKABLE, ISN'T IT, how the special detergent in "RPM" keeps belt areas free from deposits? And another compound in "RPM" makes it cling to hot upper cylinder walls . . . left bare and exposed to wear by ordinary oils. Result: "RPM" often *doubles* the period between overhauls!



Handling your brakes correctly?

When you use brakes excessively, without allowing them time to cool they may not hold when you need them in case of an emergency. It's a good idea to always test your brakes while taxiing before take off, and use them as little and as lightly as possible while taxiing. Even more important, inspect them *regularly*.

"We'll take better care of your plane"

CHEVRON AVIATION GASOLINE
RPM AVIATION OIL
Standard Oil Company of California

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun."

Headquarters are: 15th and New York Aves., Washington 5, D. C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING MAGAZINE.

FLYING TO BERMUDA?

AOPA member L. S. Caseif in Bermuda has advised our office that he will be glad to meet any flying vacationists who decide to make the 600 mile trip to Bermuda. Mr. Caseif will show visiting pilots around to local points of interest.

BUZZING

A recent CAB bulletin states that 518 fatal accidents occurred in 1947 due to buzzing. In an effort to cut down this dangerous practice by pilots, AOPA is cooperating with Government agencies to investigate every report of buzzing. AOPA headquarters will be glad to receive any buzzing reports and will see that they are forwarded to the proper channels promptly.

METALS BOOK AVAILABLE

The "bible" of aircraft designers who use metal, *Strength of Metal Aircraft Elements*, has been issued in revised form, the CAA announced recently.

Prepared by the subcommittee on Air Force-Navy-Civil Aircraft Design Criteria of the Munitions Board Aircraft Committee, the booklet is a "one-stop" reference book for metal aircraft designers. To get copies write to the Superintendent of Documents, Washington 25, D.C., and enclose a money order for $1.25.

HOW MUCH IS A LOAD?

Mr. Leo Tschechtelin, an AOPA member from South Bend, Ind., wrote us recently asking for help in interpreting a CAA regulation which kept him from carrying more than two passengers, regardless of weight, in the back seat of his Piper *Super Cruiser*. Member Tschechtelin pointed out that families with three small children could all ride at the same time without exceeding the weight restrictions.

But according to the regulation as it was interpreted to him, three children weighing a total of 180 pounds could not be carried although two adults weighing a total of 340 pounds could.

AOPA checked into the matter for Mr. Tschechtelin and promptly received word from the CAA regional office in Illinois that he could carry three people in the back seat as long as their total weight was under the weight limit and as long as they had the proper seat belt for that weight.

Consequently, our member is now able to fly with his entire family.

Busy AOPA staff members (under striped umbrellas) are shown registering part of record crowd of 1,550 at the Third Annual Round-Up flight at Rehoboth Beach, Del.

RECORD FLY-IN

Another record-breaking AOPA weekend flight took place September 17-18 when 1,550 AOPA members and guests flew into Rehoboth Beach, Del. AOPA's third annual Round-Up flight brought 620 airplanes to the resort city. According to Ed Chamberlain, Rehoboth Beach airport manager, 562 airplanes were tied down Saturday night at the field and three seaplanes were at a nearby seaplane ramp. Sunday fly-ins brought the total to 620. *(See photo.)* During the

peak of operations on Sunday airplanes were taking off at 13 second intervals without a mishap.

Because advance knowledge of the weather was so important to the success of the flight, AOPA made elaborate preparations with the U.S. Weather Bureau in Washington, D.C., and Dr. Irving Krick's long-range weather forecasting organization in Pasadena, Calif., to get the best possible forecast for the weekend. When the final green light on weather was received early Saturday morning, AOPA telephoned 20 radio broadcasting stations in a "cooperative network" to advise its members that the flight was on.

Sixteen states were represented at the flight including Florida, New Hampshire, Ohio, Louisiana and Connecticut. Mr. Walter Settle for the second year in a row flew from his home in Madison, Wis., to join the activities. Mr. George Canaday of Albany, N. Y., flew his vacationing foursome from New Orleans in time to join the AOPA crowd Saturday afternoon.

A shore dinner complete with clams and fried chicken was served to the visitors on the beach Saturday night after a welcoming speech from Mayor Downey of Rehoboth. Prizes and a community sing added up to a big evening of celebration for AOPA's 10th birthday flight.

OMNI BULLETIN

AOPA announced at its Rehoboth flight the publication of a new Pilot Service Bulletin on Omnigation. Written for pilots by Max Karant, AOPA's Editorial Director, the Omni bulletin explains simply and clearly the how, when and where of navigation by omni. Diagrams and pictures of omni equipment illustrate the booklet which is available to AOPA members free on request.

EMPLOYMENT SERVICE

Looking for a job in the aviation industry? If you're an AOPA member, write to AOPA headquarters for assistance in your job hunt. Positions are opening for A&E's, instructors, engineers, pilots and many others. AOPA will be glad to help find the right job for you.

Earnings climb, too...

IN YOUR NEW 1949 Cessna 170

YOU CAN'T AFFORD NOT TO HAVE IT!....You'll soon discover that! For this new 4-place, All-metal "Family Car of the Air" is invaluable in business....adds to family income as well as family fun!

NEW! Tapered, all-metal wing for improved stability, greater flying control, lower maintenance! NEW, more effective wing flaps for safer landings!
NEW! "Dorsal-fin" tail construction for added stability, added beauty!
NEW interior styling! Fine upholstery, beautifully tailored. Harmonizing color schemes. Deep, luxurious, roomy, comfortable seats.
140 M.P.H. TOP SPEED
145 H.P. Continental Engine. Over 500-mile range. Wide doors. Wide seats! Wheel pants extra.
NEW gravity fuel system—larger tanks. More reliability—more range—lower maintenance!

A BIGGER PAY CHECK plus more time to go places - do things - have fun! This remarkable new plane can bring you all that....and more! Business trips will take a fraction of the time they used to. You'll earn more because you'll be WORTH MORE...can cover more ground, get more done. And you'll week end , visit vacation at places which used to be out of range. For this plane is safe, easy to fly! Its 4-place luxury and comfort, 120 m.p.h. cruising speed, make every trip a pleasure...and operating costs per passenger are a fraction of ordinary travel costs!

Cessna 120-140

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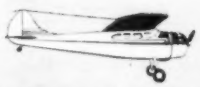

Cessna 190-195

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I Learned About...

(*Continued from page 46*)

soared along at 60 m.p.h. for perhaps 10 miles. Then I saw the "street" was ending, and I headed slightly off-course toward a sandy stretch of the Mojave River valley. Here, I expected to find another thermal caused by the heat of the sand. After reaching a low point (4,200 feet), I ran into a strong thermal of about 10 feet per second, in which I soared to cloud base at about 7,200 feet. Meanwhile, I noticed that the electric turn indicator was not working, and therefore I couldn't expect to do any cloud soaring.

Previously, "Smitty" and I had decided on three possible courses: (1) toward Kingman, Ariz., (2) toward Phoenix, Ariz., and (3) toward Las Vegas, Nev. All routes were parallel to well-traveled highways and offered safe cross-country soaring flight and good landing points.

At Barstow, I decided to fly toward Las Vegas, since the wind was strong from the southwest. We drifted toward the Calico Mountains and encountered strong slope winds but little thermal activity.

At 11:45 a.m., I had traveled about 45 airline miles. For possibly 10 minutes, we soared on the edges of the Calicos, which derive their name from multi-colored rock formations. Soaring over an unbelievably purple-hued mountain, I ran into a strong thermal and was once again on my way. Past Coyote Lake I found the thermals and clouds became fewer and the distances between them greater. By this time I was becoming hungry, so reached for my lunch sack under the seat.

After a struggle I finally got the lunch out of its receptacle—and then noticed the highway seemed much closer. In fact, it was easy to read the signs on passing trucks! So, concentrating on instruments and with one eye on the likeliest landing spot, I glided just southwest of Baker—a scant 500 feet above the ground. Suddenly, the strongest thermal of the day enabled me to spiral to 7,600 feet. Passing the 100-mile point, I again decided to strike out for Las Vegas.

At 1:45 p.m., while chewing on an apple (I meanwhile had found it impossible to soar thermals, unscrew and uncork thermos bottles and pour coffee without losing 90 per cent of the contents), I noticed the terrain was rising rapidly. But since the clouds were still building up, I figured I could gain altitude fast enough. Checking my position, I found we were 18 miles northeast of Baker, and noticed the thermal in which we were soaring was rather weak.

In a search for a stronger thermal, I turned downwind and encountered strong downdrafts. The little sailplane performed beautifully, but couldn't buck the elements. The altimeter began to unwind, and as I watched the trucks rumbling along below (on Highway 466), they appeared to grow larger at a fantastic rate.

Even with a sailplane, which can be set down almost anywhere with comparative safety, I knew I was in a precarious spot. I glanced at the altimeter again—it read 4,900 feet, and the needle was still creeping backward. Then I grabbed the map, checked the terrain elevation, and discovered it was 4,200 feet! I had a scant 700 feet to play around with, and the terrain below was rugged.

Just then I realized that I'd passed the summit, and immediately found myself in another weak but positive downdraft. That was no time for working out a long-range flight plan. I had to make a decision, and make it quick.

Immediately below was an abandoned section of highway. From my low altitude it appeared to be about 30 feet wide, with giant Joshua trees on both sides. Almost instinctively, I put the BG-8 in a "180" into the wind, barely managed to slip in over some Boulder Dam power lines—and touched down in one of the most inaccessible landing strips in the world! That was just the beginning. I still had to stop the plane, and to stop it almost immediately. Two large Joshua trees loomed up ahead, and I jammed on full brake, pushing the plane forward on its skid—within a couple of short feet of those trees!

When I climbed out of the sailplane, I decided to find out just what I'd gotten into. I measured the highway. It was 20 feet wide, not 30. Then I walked back beyond my touchdown spot, and in 100 feet hit a gully!

There was no way to get that glider out, except to tow it by truck nearly two miles along an old cow path to a clearing large enough to retrieve it by airplane tow.

Waiting for the towplane, I reviewed my close call—and considered the events which had almost led to disaster.

First, I was uncomfortable for most of the flight. Even though I wore sweater and jackets, my clothes weren't heavy enough. My feet were most uncomfortable. At times, I had to stamp them on the floorboards to help circulation.

Second, my food and drink were not properly stowed. A cross-country pilot should have food and water in easy reach, wrapped or packaged so it is not difficult to obtain.

Third, my instruments weren't functioning properly. Electric instruments should be checked before take-off. I could have flown higher and faster had the electric turn indicator functioned, enabling me to fully utilize the thermals.

Fourth, I didn't check the contours on my chart before take-off. If I had done so, I would not have left the last thermal with insufficient altitude, and would not have been caught behind a slight slope without a thermal.

Fifth, I didn't plan the flight to coincide with the proper weather conditions. Our visual observations were not sufficient, and the cold front which we thought was in the vicinity had been slowed down at the Tehachapi Mountains. My flight was about six hours too early. We didn't have a telephone at El Mirage Field, and the only way to contact CAA communications and weather was via radio. To do that, the towplane would have had to fly 2,000 feet above the field, which we decided wasn't essential. As it was, we relied on the half-hourly CAA weather broadcasts—which don't give enough information for this type cross-country flight.

Because I ignored these factors, the flight almost ended in disaster. I also had to pay for over 10 long distance phone calls, rent of a tow truck, overnight accommodations, extra meals, and the operational cost of the towplane. Had I completed the flight successfully, and landed at my destination, I could have been retrieved with little expense except for towplane and one call to the CAA communication station. In addition, I would have won my Golden "C." END

15 YEARS AGO

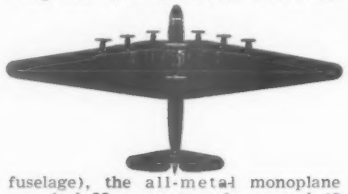
FROM the November, 1934, issue of this magazine:

United Air Lines passed its 70,000,000-mile mark. (United's total mileage to date is approximately 536,000,000 miles.)

The world's largest landplane, Russia's 42-ton *Maxim Gorky* (ANT-20), made its flying debut over Red Square in Moscow. Specifications of this giant plane were:

Span	206 ft. 7 in.
Length	108 ft. 3 in.
Height	29 ft. 6 in.
Maximum range	1,240 miles
Maximum speed	161 m.p.h.
Landing speed	62 m.p.h.

Powered by eight 750-850 h.p. engines (six along the leading edge of the wing and two in tandem above the



fuselage), the all-metal monoplane carried 23 crew members and 40 passengers.

Built to distribute propaganda, the ANT-20's equipment included a 550-pound rotary press which turned out 8,000 leaflets every hour, a photographic laboratory, a wireless transmitting plant with loudspeakers for broadcasting from the air, movie projectors for propaganda films, and electric bulbs which displayed slogans on the underside of the wings. The plane also had a library, passenger lounge, a 16-telephone switchboard and a buffet for hot meals. (It was destroyed in an air collision in 1935.)

Two women pilots, Jean LeRene and Mary Elizabeth Owens, were forced down while trying for a new endurance record. Not discouraged, Mary told reporters, "We were not the least bit tired after that one five-day period, and it is not nearly so boring as I thought it might be. There is so much to do . . . that you don't have time to get it all done before the day is over."

TWENTY YEARS AGO

B. G. Dahlberg reported in "The Magic Carpet of Business" that he had flown 300,000 miles in his Stinson *Detroiter* between the widely separated offices and factories of the Dahlberg Sugar Industries.

FASCINATING WORK RICH REWARDS IN AERONAUTICAL ENGINEERING

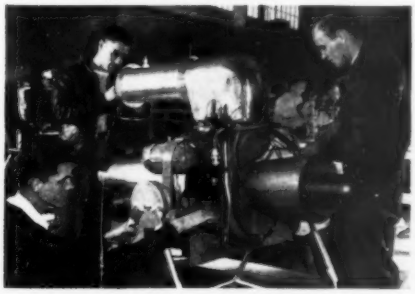
Right in this magazine, and in your daily newspaper, you see unfolding the swift, spectacular progress of *Aviation*—sensational new speed records ... ever-expanding, world-wide commercial airlines... spectacular new military aircraft. Right before your eyes are these thrilling achievements of *Aeronautical Engineers*—swifter, more powerful, more efficient planes ... performing ever more amazing feats.

Back of the countless new aircraft and new achievements yet to come, there must be trained engineers performing their fascinating duties, and enjoying the rich rewards of success, personal achievement, and the thrill of contributing to the great *Air Age.*

Here is a ringing challenge to the young man of imagination and ambition. Here is a career field where your talents—whether creative or practical—can have full play. Here is the ideal combination of security, unlimited opportunity, interesting work, and good earnings.

Models and contestants in one of the frequent meets held by Northrop Model Club. Through model building, students express the expanding knowledge of aircraft design and construction acquired during their aeronautical engineering training.'

BIG JOB for engineers was inspection of completed 57-foot-high tail fin on Air Force's XC-99 Consolidaied Vultee transport, world's largest land plane ...an example of the interesting and varied duties performed by aeronautical engineers.



As a practical training project, Northrop engineering students developed this lightweight turbojet aircraft engine by adapting a fighter plane turbosupercharger, the students themselves designing and building the combustion chamber, ducts, tail pipes, and electric controls.

Northrop student engineers consult on dual control arrangement for student-designed and built private plane. Complete metal mock-up shown here was fabricated and assembled by students as part of practical training project.

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THE LIBRARY

THE EAGLE IN THE EGG, by Oliver La Farge. Published by Houghton Mifflin Company, 2 Park St., Boston 7, Mass. 309 pages. Price $3.50.

This is the story of air transport in the somewhat late war, the story of the Air Transport Command, as it was called. The word Command was added to the appellation for the same reason that majors wear pink pants, but it contributed to the general confusion which bewildered the enemy and, as everyone knows, won the war.

This history of a military service is in a class by itself. Usually such books are half propaganda and half whitewash. There is none of that sort of thing here. Here you get the inside dope, the low-down, the McCoy. La Farge is a reporter, the highest compliment in the field of letters. And he was the official historian for the ATC—how he gets away, with telling the truth your modest reviewer can't make out.

Oliver was plagued by too much material. There was not only one drama to set down but hundreds of dramas which, if written out, would fill hundreds of books. What we get, of necessity, are synopses, but the reading is lively enough for all that, and every few pages there is mounted a gem of an anecdote. There is the time that Jacqueline Cochran gave orders to General Hap Arnold and he replied, like a soldier, "Yes, MA'M," a situation that is especially amusing in view of the squat tag now being played in Washington over the B-36.

The author wished to give us a broad understanding of military air transport then and now and some fun in getting it. He did.

—HIRAM WILSON SHERIDAN

THE BISMARCK EPISODE, by Capt. Russell Grenfell, R.N. Published by The Macmillan Co., 60 Fifth Ave., New York, N. Y. 219 pages. Price $3.

In May, 1941, Britain faced Germany alone. Nazi U-boats skulked along British sea lanes, littering them with giant splotches of oil and the floating debris of English ships. Had the German battleship *Bismarck* been able to join the U-boats in their intense attacks, loss of oil supplies alone might have grounded the RAF.

The British knew this. On May 21, 1941, they spotted the *Bismarck* and her consort, the *Prinz Eugen*, steaming northward through the Kattegat toward the North Sea. And for the following six days, 48 British warships and scores of shore-based aircraft participated in one of the most dramatic hare-and-hound chases of modern warfare.

When the battered *Bismarck* finally was sunk (May 27, 1941) in the North Atlantic several hundred miles west of Brest, France, no one knew better than the British Admiralty that fate had played on its side.

A chance hit in the *Bismarck's* fuel tanks left an oily trail for the British to follow. The subsequent loss of oil reduced the *Bismarck's* speed; otherwise she would never have been hit in the rudders by an aerial torpedo. Fate intervened again when German U-boats, sent to the *Bismarck's* aid from Brest, combed the wrong area. And, by another happenstance, several German U-boats finally arrived on the scene *with empty torpedo racks* and were forced to stand by helplessly while the battleship was sunk.

Author Grenfell's account of the 3,000-mile pursuit and sinking attains heightened suspense by his use of British Admiralty records almost exclusively. The reader is able to feel, even through rather dry prose, the urgency and drama of the chase.

Unfortunately, because the reader is always with the hounds and never with the hare, the chase at times seems almost unreal. The *Bismarck* appears and disappears in the North Atlantic mists like a wraith, with no emotions or motives imputed to the crew.

Perhaps if Grenfell had consulted German Admiralty files more extensively, and had included several survivors reports, together with photographs of the German commanders, a more rounded picture might have resulted. In any event, "The *Bismarck* Episode" is an unbiased factual report of a memorable sea battle.

—WAYNE G. SLIFE

* * *

SHORT VIEWS

ROTATING WING ACTIVITIES IN GERMANY DURING THE PERIOD 1939-1945, by Capt. R. N. Liptrot. Published by His Majesty's Stationery Office (available at British Information Services, 30 Rockefeller Plaza, New York 20, N. Y.). 75 pages. $1.

The text of this paper-bound book, taken from official German documents, describes in detail the construction, performance and duties of Germany's rotary-wing aircraft.

THE AIR LEAGUE BOOK. Published by The Foley House Press, 31 Foley Street, London W.1, England. 96 pages. Price $2.50.

Fourteen widely-known men in British aviation "lay bare the weaknesses and strengths" of post-war aviation in Great Britain.

Confessions

(*Continued from page* 31)

line had time on his hands. He would, he assures me, be delighted to fill out the forms except:

1. He has to go to the field and get a parking sticker.
2. He has to attend an important ALPA meeting.
3. He has to take Link time.
4. He is scheduled for an instrument check and must review his approach charts.

He has been yelping about that parking sticker for months.

He skipped that last ALPA meeting without a qualm because he had to finish up his model airplane in time to enter it in some race.

He is four months behind in his Link time and makes me answer the phone when the Link Instructor calls to plead with him.

His instrument check is due next month; I ought to know, he makes me keep all his records.

So I get out the books and give with the answers.

If he is uninterested and doesn't check up on my work, I'm in good shape; but, inasmuch as these queries eventually become part of his permanent file, he sometimes condescends to read them over. Then I got troubles.

"Are you sure," he demands, "that you got this fuel dumping procedure right? It seems to me that the rate of flow should be greater than 50 gallons per minute." I *was* sure—but I'm not now. Back to the books.

"Yes, 50 gallons is right."

"Okay. What about this procedure in the event of radio failure? What made you think that you would proceed to the range station in this case? Are you positive that they mean the range station when they say 'the facility serving the destination airport'?"

Nope. Back to the books. And so on, late into the night—and continued at breakfast.

Generally speaking, the airline uniform is a pretty neat rig. All Airline Wives may take a bow. Certainly the man in charge of the airplane has little to do with his trim appearance. If he had his way, not even a high school girl would give him a second glance. When he isn't actually flying—or golfing—the average airline pilot sinks back on his duff and becomes absorbed in the seniority list. Any form of exercise (except golf) is foreign to his nature and his figure is proof positive. Nagging is a waste of time. Pointing out to him that his zipper doesn't *quite* close, his blouse doesn't *quite* button and the transition from the standing to the sitting position had better be a gradual one is a royal squandering of effort. He refuses to face the issue. His uniform looks just dandy to him and that's that. So that the popular concept of the Airline Pilot won't explode in the face of tragic reality, the Airline Wife spends her odd moments tactfully moving buttons, letting down trousers and moving zippers over so far that only a prayer

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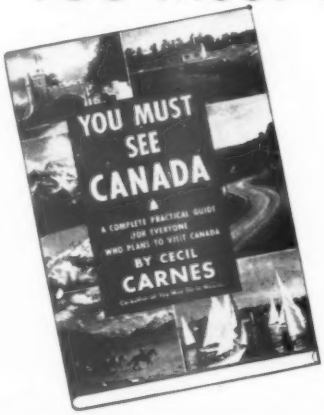
by CECIL CARNES



Canada—coast to coast—as seen by Cecil Carnes, world traveler, adventurer, story-teller extraordinary. Canada offers a warm welcome to travelers—particularly to flyers—and here is the book no visitor should be without. Price

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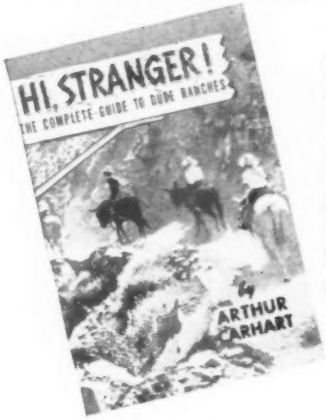
HI, STRANGER! THE COMPLETE GUIDE TO DUDE RANCHES

by ARTHUR CARHART



Flying west? Dude ranching? Here is the reading that will take you from tenderfoot to top hand in one easy move. What to take, how to dress, how to act, by the country's outstanding "western authority," Arthur Carhart. Price

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by CHARLES D. MATTINGLY

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LOGGING TIME

WITH HY SHERIDAN

Captain, American Airlines

BEES FLOCK TO HONEY

The B's have been flying around pretty thick in Washington, including the B-36's, the B-47's and so on, not to speak of the B-jabers! and the B-quiets. If you are a taxpayer there is no reason why you should be interested in all this buzzing because however it comes out, it goes in the same old way. You are pretty sure to get stung.

* * *

Two members of the Vinson committee were discussing the arguments that had been put up by some of the witnesses. One of them said, importantly, "Dose B-Toity-sixes can take bums any place in the voild."

"Rawly? I had understood that that was the function of the Air Transport Service, donchaknow."

* * *

THE WATCHED POT

Since middle age is always five years older than you are, I shall not be able to use it herein but instead I shall have to use the phrase "age of discretion," which in a man means the time of life when there is a slight slowing down of his instinct to fight or frolic, largely because he is no longer as fast on his feet as he used to be. He has become a solid citizen, and a good part of the substance seems to have collected just abaft of the belt buckle. So it is with your reporter.

Why a pot belly should be in disrepute is beyond me. It indicates the fallacy of the theory that a man cannot eat his cake and have it too, and there is no denying that it is a lot of company on a cold night.

Therefore you can imagine my annoyance when my young son, who has no more respect for me than the president has for Congress, began to call me Fat Belly. As a wise father should do I gently pointed out his social error. He promptly abandoned his impolite epithet. Now that I am flying on the Mexico run he calls me Pauncho.

* * *

I was young once myself, but I got over it.

* * *

GIVING US THE BIRD

Well, it looks like we are about to have a practical solution of the weather problem. Dr. Orval H. Mowrer, a psychologist at the University of Illinois, is teaching birds to talk and this is not a frivolous pastime but a serious inquiry into the genesis of the faculty of speech *per se*. What interested your reporter was obvious—the use of talking birds in aviation.

When you get your airplane to what you had naively thought was to be your destination and you find that there is an overcast below you and you don't know whether you ought to take a chance on going down through or not, you can just open the window and send your feathered pet down for a look, to report when he gets back. The idea isn't new. Moses tried it.

But the most interesting item, at least to your humble reporter, in Dr. Mowrer's preliminary report was the statement that one of the most "curious" things that he and his associates had discovered was that when they had taught the female bird to talk, she was then useless for breeding purposes. What I should like to know is whether this is the conclusion of the scientists or of the male birds.

* * *

Sadie says that the reason so many of the screen actresses get married is that they like to defy the conventions.

* * *

DISTINGUISHED PASSENGER

Mr. Henry Morgenthau was a passenger on my plane a few nights ago. He will be remembered as the man who ran the national treasury, which was a funny thing to call it since they didn't have any treasure whatever and still don't, but are really in the hole. Henry created more imaginary money than anyone else in history and consequently it is interesting to note that he is writing his memoirs. I suggested a title for his book. Fund Recollections.

* * *

YOU HAVE TO BE PLAIN WITH SOME PEOPLE

The flying instructor turned to his student in disgust. "I told you to make a three-point landing."

"I thought I did."

"Like hell you did. You hit on the left wheel, the tail, then the right wheel. When I say to land on three points, I mean just that. Get it?"

"Oh. You mean *simultaneously?*"

* * *

MONTHLY EPITAPH

See, carelessness is evil's root
And guessing is confusion:
He thought he'd packed his parachute—
He jumped to a conclusion.

Anonymous

connects them with the opening they are supposed to close.

But even an Airline Wife has her day. Eventually, the uniform becomes too shoddy for the man it graces and a new one arrives for approval.

"Doesn't it seem a little tight to you?" asks the Brains of the Family.

"It's snug," I agree, diplomatically.

"That damn tailor got the measurements wrong. How about the length?"

"It could be a little longer, honey. I know a uniform isn't supposed to break over the instep but I don't think it should be two inches above the shin bone."

"They must have made the pleats too small; it feels awfully tight when I sit down. Jeepers murphy . . . for 120 bucks the least it could do is fit!" Amen. A woman who doesn't really care about being married to an airline pilot could recall that the measurements for this particular uniform were taken during the late summer when the Measured One was skipping around the golf course several times a week—and that it is now late fall. Anyone who is still thrilled with the fact that she is wedded to a member of the highest form of "skilled labor" had better keep her mouth buttoned.

If the Measured One decides push-ups are indicated, one of the really rough spots looms in an airline marriage. The sight of a man who habitually rises at noon and is apt to be petulant at having to climb out of a nice warm bed before the sun is high is unnerving. First, an airline pilot in his naked strip ain't purty—not if he has any seniority on the line. Seniority is directly proportionate to the midsection. If he happens to be a junior copilot, his salary will keep him so skinny that he'll have to hold his uniform up with Scotch tape. If he's a senior co-pilot without too much responsibility, his uniform will fit. If he's a reserve captain, his uniform will vary; some months it will fit beautifully and other months it will be loose enough to spin in without touching the sides. If he's a captain with any seniority at all, it will be too tight, period.

Let's get back to my Baby. He has enough seniority so that he has uniform trouble or, better said, *I* have uniform trouble. The first time he decided that push-ups were in order he sprained his arm and was off flight duty for two weeks. Being off flight duty is not the vacation that it sounds; you don't get any rest for you're too busy computing the dough you're losing. And losing dough, for an airline pilot, is like having a good right arm sawed off without anesthesia. Another daring venture into morning calesthenics resulted in a first-class mouse which he says occurred when he slipped trying to get the window open so that he could suck in great droughts of fresh Long Island air.

Physical exams and instrument checks keep an Airline wife's life from being monotonous. Without referring to the records, I can tell a week in advance that the Company is about to demand that my Beloved show good cause why he shouldn't be digging ditches instead of jockeying one of their expensive airliners. He flings himself out of bed in a ferocious humor and refuses to be pacified, even by the

Aviation has captured the imagination of the young men of America more than any other industry in the history of our country. It has become essential to our way of life, our national economy and our existence as a nation. It is an expanding industry that offers opportunity to the pioneer spirit of American youth. Don't be a square peg in a round hole. You can "fit" in aviation only if you have ability, ambition and *training*. There has never been a better time to get started than right now because of the great demand for trained men. SPARTAN has more calls for graduates than can be supplied.

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prospect of an entire day on the golf course.

"It's so pretty out, honey," I say hopefully. "Why don't you give Sam a ring and go on out to the club?"

"Mutter mutter mutter."

"What did you say, dear?"

"I SAID I DON'T WANT TO GO OUT TO THE CLUB. I GOLFED ALL DAY YESTERDAY AND I'M TIRED."

"All right. What would you like for breakfast?"

"Don't want any breakfast."

"How about some coffee?"

"Coffee keeps me awake, you know that. Mumble, mumble, mumble."

I sigh. There is no sense in trying to clean up the house. He is going to be directly underfoot no matter which way I turn and he is going to be insufferable. And he is. He spends most of the morning prowling through the house, wiping an inquiring finger over the furniture and screeching to Heaven if he finds a trace of dust. "My God," he yowls from the spare bedroom, "this place is positively filthy. Don't you ever clean up here?"

"Yes, dear, but you were working on your model airplane in there day before yesterday and told me not to touch a thing until you got through."

"Well, dammit, I wasn't working under our bed was I? It doesn't look like you've been under here with a mop since we moved in." Well, I have, you old goat, and if you don't trot yourself outdoors and work off some of that venom, I'm going to take the mop and mash you flat.

"I'm going to clean in there this morning, dear. Don't worry about it."

Around noon he shows up in the kitchen with an aggrieved air and says pitifully, "I'm hungry. I didn't have any breakfast." I try taming the tiger by fixing him French toast which he loves, but he toys with it half-heartedly.

"Think I'll go out and take some Link time," he announces. Ha. So that's it! He's due for his instrument check—I might have known. Just as soon as he clears the house I pick up the phone and cancel all engagements for the next week. What if it did take us three months to get those tickets to "South Pacific"? At the very moment I should be sitting in my best gown watching the curtain rise, I'm going to be pawing frantically through the navigation kit trying to find out what the pixies who publish NOTAMS mean when they say that La Guardia is QUALEN QUAGEN.

The symptoms of an impending physical are a bit more violent—but not the Boss! Instead of stomping around the house in a villainous humor, he lies abed way past his normal rising hour.

"Don't you think you ought to get up, dear? I want to change the linen."

"Cad ged ub. I'b sigg. Feel horrible."

He's *never* sick. It is possible, however, with all this Virus X going around . . . I take a good look at him. Short of the green pallor that he assumed along with the privilege of flying trips that depart after six in the afternoon, he looks all right to me.

"Do you have a fever?"

"I thingg so. Ged the thermometer."

"Here it is and, *please*, just this once, leave it in for three minutes? It doesn't help a bit to take it out of your mouth every 10 seconds to see how it's getting along."

The thermometer reading scares me nearly to death! Nobody, not even an airline pilot, could have a temperature that low and still be walking around.

"You don't seem to have a fever," I say brightly. "Maybe if you got up and ate a little something you'd feel better."

"Cad eat a thigg. No appetite. Upset stomach. Sore throat. Pains in the back."

With much groaning, he wobbles into the breakfast nook and is persuaded to swallow a light snack: three eggs, four slices of bacon, two English muffins, a dish of bananas and cream and three cups of coffee. "Sigg," indeed!

The morning goes quickly. Where's the aspirin? Get the hot water bottle. Do I think he gets enough exercise? Maybe he gets too much exercise. Do I think he ought to give up golf? Did I remember to make the last payment on his life insurance like he told me to? Yes, I did, and if this keeps up I'm going to get out the Colt 38 and start collecting.

I lure him out of the kitchen (so I can get the dishes washed) by insisting that he lie down on the couch in the living room for a while. It's a nice thought but I should live so long. He's not interested in any easy death on a soft pillow; he's going to die with his boots on—probably his golfing boots.

"Honey, please lie down," I plead. "Just let me finish the dishes and then I'll see that you're taken care of."

"What?"

"I said lie down until I get rid of the dishes and then we'll call the doctor if you like."

"Oh. You know, I don't think my hearing is as acute as it used to be. It's keeping those damn earphones on all the time that does it. Have you noticed that I don't always hear what you say?" Yes, my sweet, I've noticed it; mostly when I ask you to go down and do something about the furnace.

"I hadn't noticed, dear. Your hearing seems all right to me."

"Well, something's wrong." I flip back into the kitchen and start my work.

"C'mere quick," yelps the Boss from the sun porch. Omigawd, he's collapsed! I speed to his side. He is kneeling at the window, his head cocked at an alarming angle and a distressing squint on his face.

"What is it, dear?" I'm panic-stricken. "What's the matter?"

"Nothing's the matter." He looks at me suspiciously. "I want you to take a look at that sign across the street and tell me if you can read the small print at the bottom."

"I can't even read the print at the top but if you really want to know what it says, I'll be glad to step over there and find out."

"Don't be silly. I don't care what it says. But it does seem to me that, if my eyes were still 20-20, I'd be able to read the whole sign from here. And I can't. The television set goes today. My eyes were okay before I started looking at that thing all the time." Yeah, Jughaid, and your eyes are still all right. You're the only man I know who can stand on the tee and judge to the inch how far the ball is from the cup. But I'm relieved. I know I still have a few years of happy married life ahead. There is nothing the matter with the Boss, he's just conditioning himself to take his CAA physical.

Obviously, the airline man would be in poor shape were it not for his wife: his operations manuals would be hopelessly out of date; his permanent file would be overflowing with un-passed examinations; he would bust his instrument checks and be in such deplorable physical condition that nothing would really matter anyway. We're the gals that stand in front of him when it looks like he is headed for a kick in the teeth and behind him when he needs a push. We're invisible, but we're there.

I hope that slick chick in Columbus takes that last statement literally. At my age, I worry a little. END

FLYING

"Darndest crosswind I ever encountered!"

Baby Your Engine . . .

(*Continued from page* 41)

the type of power plant. The loss of r.p.m. is very irregular with a fixed pitch propeller but is more constant when the ice formation is slow. This drop in "revs" may occur in a minute or over several scores of minutes.

"*B. Rough Running.* When the fuel-air mixture is not correct, the engine 'roughens.' This fact may be used as an indication of carburetor icing; however, as rough running may be attributed to many other causes, and many engines that ice do not run rough, this indication must be used in conjunction with other symptoms. Roughness due to icing is possibly more noticeable on engines with the light weight wooden propellers than the heavier metal ones with more 'flywheel' effect.

"*C. Exhaust Flame and Smoke.* Some pilots of small aircraft believe, when exhaust flame or smoke can be seen from cockpit, that a *definite* check can be obtained relative to carburetor icing. This cannot be true, as the mixture does not always indicate richness, under icing conditions. If the venturi ices, the mixture will be rich; however, if the discharge nozzle ices, a lean mixture will result. Mixtures estimated without the proper instrument may be near enough to the correct ratio not to show by color of flame or smoke, and yet the engine fails because of icing. Use only as a check with other indications."

Icing is so important to lightplane pilots that they should study carefully the following "don'ts" from the CAB Safety Bulletin.

"1. Don't wait—act immediately when loss of power is noticed.

"2. When the weather is humid and temperature is below 80°, do not warm engine or taxi the aircraft with carburetor heat off.

"3. Don't take-off with carburetor heat 'on.' Adjust for full cold during take-off and put heat on during icing conditions after power has been reduced.

"4. Don't 'pull on' a little carburetor heat, followed by a little more, etc., when icing conditions are suspected. Pull all heat on and decrease from that position if possible after power has been restored.

"5. Don't 'give up' when carburetor icing persists after preheater control has been set 'full on.'

Open throttle wide.
Put aircraft in a climbing attitude.
Adjust for a leaner mixture, with altitude control.

The efficiency of the preheater is then increased tremendously. Avoid diving or any increase of air speed, thereby dissipating heat more rapidly. Do not, of course, climb into an overcast, where icing conditions may be.

"6. Don't forget to use carburetor heat, on every occasion, when throttle is restricted beyond the cruising speed. This is especially important when the throttle is 'closed.'

"7. Don't wire the preheater valve in full 'hot' position during cold weather. Remember your preheater manual control

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WILBUR WRIGHT'S PREDICTION

•

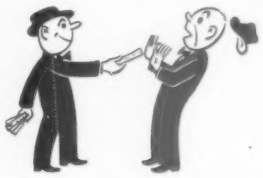
AIR FORCE QUEEN HAS QUADRUPLETS

• HE'S ALL WET

From the Dark Continent comes new light on rain making. Charles Hall, a farmer near Port Elizabeth, South Africa, claims he can precipitate rain from any cloud, using electrically-charged sand sprayed from a plane. Hall says this method is more effective than dry ice.

• FLIGHT FRIGHT

In preparation of a university thesis entitled, "The Problems of Public Skepticism and Fear as Related to Air Travel Advertising," flight instructor Harold Littlefield of Livingston, N. J., conducted a survey on the street. He



was looking for persons who had never flown because "it is too expensive." When he found them, he offered each one a pleasure flight *free*. He made 50 offers and had *no takers*. "It is the butterflies in the stomach, not the moths in the pocketbook that keep 'em grounded," was his scholarly conclusion.

The average shipment by Air Express in the U. S. weighs 17.7 pounds and is flown 864 miles.

• MOUNTAIN MYSTERY

Not long ago an airline pilot radioed Portland, Ore., that he saw a mysterious cluster of red lights near Mount Hood. Because of the old flying disc panic, an investigation was begun immediately. Was it a weird ship from Mars? No, just a mountaineer club holding a fireworks display.

• TURNABOUT IS FAIR PLAY

The State Fair Grounds at Hutchinson, Kan., built a permanent landing strip for Kansas' flying farmers for this year's fair. Now farmers who once drove their horses to the fair to see airplanes will fly their airplanes to see horses.

• ALL-TIME HIGH

Paul Mantz was hired recently to do the risky flying for screen star Gregory Peck during the filming of "Twelve O'Clock High." While the cameras whirred, Mantz dove his plane between two tents, narrowly missing both, then made a spectacular crash-landing. Blood pressure of studio officials zoomed as they watched the performance, but it hit an all-time high when they saw Peck climb out of the plane too. "I thought it would be fun," he explained.

After her first plane ride at Malone, N. Y., Mrs. Liza McGee, 93, called it "a free ride into heaven." Her husband, 38, decided to stay on the ground.

• HALLELUJAH!

In Dallas an American Airline's reservation clerk had a severe case of laryngitis, making it difficult for her to be understood over the phone. She had to repeat herself several times to a would-be passenger. Earlier he had disclosed that he was a doctor, so she asked him for advice. He answered: "I recommend prayer. I am a Doctor of Divinity."

"Man will fly some day but not, I think, in our lifetime." That statement was made by Wilbur Wright—two days before he and Orville made their famous flight at Kitty Hawk.

• LIQUID ASSETS

When Airport Operator Edward C. Watson, San Mateo, Calif., took a look at his $18,000 tax bill, he hurriedly wheeled out a plane and called the tax assessor. A short hop over Watson's real estate holdings convinced the assessor that most of the land was under water. That short plane trip saved Mr. Watson exactly $4,800.

Navy Mars flying boats carried 21,277 passengers without an accident last year.

• PUTTING ON THE DOG

At San Antonio, Tex., the Air Force granted one of its poster girls special leave to raise her quadruplets. The

model mother poses for pictures stressing the importance of safeguarding military information. She is Rhelma's Golden Lady, a photogenic bulldog.

—Harold Helfer

was installed for a purpose. It is possible to 'ice' in the summer time and not possible in extremely cold weather (below zero F.).

"8. Don't blame all engine failure forced landings on carburetor icing. Alibis so described are often traced as an impossibility under the existing conditions.

"9. Don't be mystified when your aircraft drips water at the carburetor intake after landing. It should be an indication you were not using a sufficient amount of 'heat.'

"10. Don't tell your instructor that you couldn't make your engine backfire or cough back through the carburetor when an altitude adjustment is available. He will possibly demonstrate a 'cough back' by using full throttle and *suddenly* leaning it, before the engine has lost momentum.

"11. Don't start an engine with carburetor heat 'on.' The priming may be lean, especially in cold weather, with a resulting 'pop back' through carburetor which may damage the preheater, especially if not equipped with an air chute blow-by valve.

"12. Don't forget, when heat is applied there will be an immediate indication of a lower power output, due to hotter air. The manifold pressure gauge will drop somewhat as heat is applied, then increase as the ice melts. The preheater control may be momentarily returned to full cold to ascertain if power has been restored. The tachometer reacts in much the same manner, except when using constant speed propellers.

"13. Don't forget, the carburetor heat control, when mounted on instrument panel, is out of reach of pilot when it is necessary for him to occupy a rear seat while flying solo. In this event it is better to have heat full 'on,' at all times, when icing conditions are suspected.

"14. Don't 'feel' you are at a loss with aircraft not equipped with manifold pressure or temperature gauges. Experiment with heat—study—know your aircraft. Remember a change of equipment may change the indications.

"15. Don't neglect your carburetor heater.

Check exhaust collector cuff or finned fitting for looseness or cracks.

Check butterfly or damper valve for adjustment with manual control, secureness on shaft. Valve seat fits to exclude all cold air when 'on' and exclude hot air when 'off.'

Check 'whips' in valve control.

If flexible shaft is used, make certain wire housing is secured near lower end of flexible housing."

In short, common sense is the pilot's best guide to treating his engine gently. The pilot who uses common sense will obtain best all-around performance by following the manufacturers' recommendations for take-off, climb, cruising speed and altitude operation. For good engine life, he will be sure that the cooling system is always in good condition and that the engine is not overloaded and does not overheat.

Let the operator be good to his engine and it will be good to his pocketbook. END

MAJOR ROBERT CRAWFORD

the man who put

"THE WILD BLUE YONDER"

into the sky

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"Today, with CAA as full of red tape as ever, putting every possible obstacle in the way of private aviation development, you are needed as never before! Keep up the good fight. As president of the Greater Miami Aviation Association, I extend to you my congratulations and good wishes."

(Signed)

BOB CRAWFORD
AOPA Member Pilot 6270

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The Mail Box

(*Continued from page 6*)

NEEDED: SALESMEN

. . . I read your article, "Mr. Fumblebob Visits an Airport," [August FLYING] —and imagine it was amusing to airport personnel.

But there is another side to the thing . . . The aviation industry takes the public for bigger fools than they are.

I doubt seriously whether it was necessary for most of the non-flying public to read the article to realize what most of the people around airports think of them. . . .

Last year I determined to purchase either an airplane or a helicopter, if someone could give me some good sound logic on airplane safety, economy, range, etc.

In the end, I bought a $4,500 automobile because of evasive answers like the following: (Since the manufacturers hadn't made a completely safe airplane, I was attempting to take a plane and make certain additions to increase the safety factor.)

Question: Is there a Diesel engine that could be substituted for this radial gasoline engine?

Answer: You don't need a Diesel engine because fuel economy is already good.

Answer to that: I'm not thinking of fuel economy. I am thinking about having a small crackup and burning to death in a gasoline fire.

Q. Can a fuel injector be put on the engine?

A. You do not need a fuel injector, because the factory has done such a good job of designing.

Answer to that: Many accidents are caused by "engines not taking" at critical moment of engine acceleration.

Q. Can an automatic pilot be placed on this airplane?

A. You don't need an automatic pilot because this plane practically flies itself.

Answer to that: In case of being caught in a storm I imagine the plane would be doing the piloting—not me.

Q. Can de-icers be installed on the plane?

A. When you go in for stuff like that, you have to buy a plane that costs $70,000.

Answer to that: Such a large plane requires three to five times as much gasoline to go the same distances—to say nothing of the added maintenance.

Q. Can gyro instruments be mounted on the panel?

A. Certainly. What makes you think they can't?

Answer to that: Because the instrument installation man (three doors down) says they can't.

Q. Can a self-actuating variable propeller be put on the plane?

A. You don't need one. We have a manually-operated propeller on the plane, and it costs $1,400.

Answer to that: But I am not a pilot. I am just one of the public—and I don't want to risk hunting for gadgets in an emergency.

This sort of questioning and answering went on indefinitely—getting nowhere.

Contrary to what most aviation enthusiasts believe, the general public has little contact with aviation. And when we do visit an airport, we indeed feel like Mr. Fumblebob . .

In the automobile business, they call these idle observers "customers."

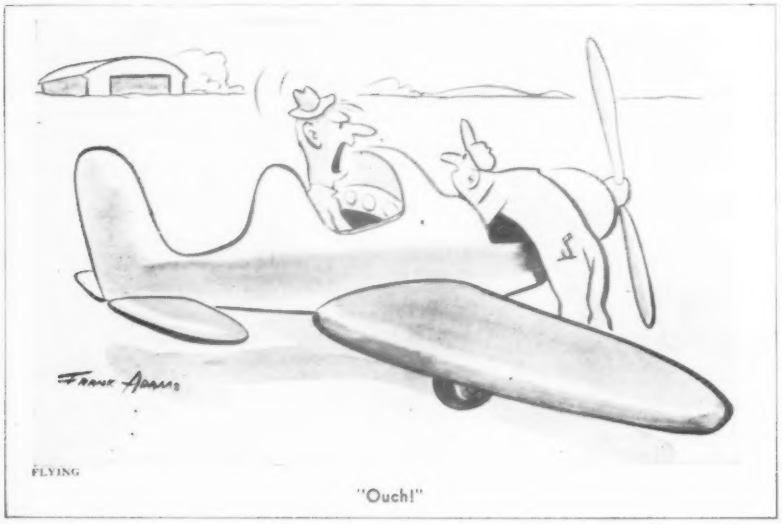
So when I couldn't do business with the aviation boys, I casually dropped by the Packard store, just to see what was around . . .

Believe me, they didn't sit around and point at me and say: "Gee, ain't he a funny guy. He's wiggling the gear shift; the dope doesn't know what it's for . . . Let's go over and have some fun out of the stupid looking bird."

And they didn't give me an evasive answer when I said I wouldn't have a car without an overdrive, and they didn't blink an eye when I said I wanted a front and rear heater, and a front and rear loudspeaker. They put them in!

ROBERT O. SMITH

Fort Worth, Tex.



"Ouch!"

QUICK SOLOS

I don't believe Mr. Holcombe ["Push-Button Instructor," July FLYING] established a world record soloing students in 2 hr. 5 min. and 2 hr. 55 min.

Without the aid of the push-button device, I soloed Mr. Reinaldo Lamas in 2 hr. 50 min. in a Cessna 120 (which is more difficult to fly than a Piper J-3). His first flight was his first lesson. [Even though] our airport is bordered by some hills and has narrow unpaved runways, he soloed in a perfect three-point landing without using the stabilizer at any time.

A few days ago I soloed Dr. Hector de Zayas Bazan after 12 lessons given in 4 hr. 40 min. in a Luscombe *Silvaire*. He had no previous experience. . . .

CARLOS M. SUNOL FAJARDO

Santiago, Cuba

TOO MUCH MILITARY?

. . . To say "who cares about supersonics and building a station in space?" and "military aviation is, of course, of passing interest" ["The Mailbox," August FLYING] bespeaks extreme narrow-mindedness, in my opinion.

Your magazine is the only one I can get that deals at all with American aircraft that are of importance, and your military and other articles of late have really been worth reading. . . .

G. D. SCOTT
Royal Observer Corps

Plymouth, England.

. . . I am a student pilot, trying to get my private license, and my interest is in the grasshoppers, the puddle jumpers, the Piper *Cubs*, Aeroncas, Taylorcrafts, Cessnas, and Luscombes. I have only a superficial interest in jets, supersonic planes, bombers, fighters, transports. . . .

E. L. HOLMES

Portland, Ore.

Why has your circulation jumped? I'll give you odds that one reason is that ex-service pilots subscribe to keep up with the latest in military aviation.

I've read all types of aviation magazines—and FLYING is tops for keeping vet pilots up to snuff on military advancements.

D. E. BERGAN JR.

Kankakee, Ill.

. . . You don't have enough about private flyers. Let's have more articles on how small businessmen make use of their planes to help them in business.

ELLERY P. FERRARA

New Orleans, La.

. . . I am behind FLYING's editor 100 per cent, and congratulate him on the [many] excellent military articles.

DONALD H. TROTT

Fond Du Lac, Wis.

I have enjoyed FLYING for a number of years and have learned much that has helped me in my flying. However, I agree that we should have more articles on civil flying and less on military aviation.

MELVIN I. MILLER

Goshen, Ind.

You Can Fly It

(*Continued from page* 38)

with caution. A lightplane pilot, on the other hand, often becomes overconfident after many hours in the cockpit of one model plane, then sometimes gets careless.

The fields he must use are many times rough and rolling, and occasionally too short. The net result is consistently smoother landings in "hot" planes than in slow landing ones. Prove it to yourself. Next time you are at the local airport note the quality of 10 consecutive landings. Were they in the first quarter of the runway? Were they smooth or rough? Then compare the lightplane landings with 10 at your nearest airline terminal or military field. The results will convince you that fast landing ships can be set down just as easily as slow ones.

One Joe Breakhead I know thought there was nothing to any landing. He put it this way. "Just take any ship up and stall it. Then glide at 20 m.p.h. over stalling speed. When you feel the wheels touch the weeds, pull back on the stick. You're home." It's not quite that easy. The safest approach to flight in a new plane is a thorough check out by a competent instructor. Simply remember that with a little practice you can become just as capable as the next pilot.

A few years ago, many of the planes available to private pilots had strong ground-looping tendencies. The Waco F, Fairchild KR-21, and some models of Monocoupe were among the worst offenders. The superman class of old timer spared no chance to boast about his prowess. You would think that only he had mastered a straight landing, minus ground loop.

It is true that because of worn gear bushings, offset tail skids, no brakes and short fuselages, the threat of a ground loop is ever present in many of the old open biplanes. A knowledge of when they are most likely to occur and how to prevent them might have saved many an operator a wrapped-up plane. Many hundreds of dollars from student instruction have been lost by commercial operators with washed-out planes.

A ground loop is most likely to occur when no wind is blowing or when landing crosswind. All planes tend to turn into the wind; a groundlooper keeps right on turning. No plane I have ever flown will try to ground loop if landed on the wheels into a good breeze. Rudder it all the way to a dead stop. Any ship will go around if you go to sleep on the rudder pedals and land even 15° out of the wind. Naturally, when the wind is calm there is less rudder control at slow ground speeds. It is lack of rudder control or insufficient rudder control that causes a ground loop. Use opposite brake when rudder becomes ineffective. Stay ahead of the plane until the landing roll is completed. A little opposite rudder will often stop an oscillating plane. Full opposite rudder may be insufficient if the plane turns over 45°. I learned about ground loops early in my own career. (*Continued on next page*)

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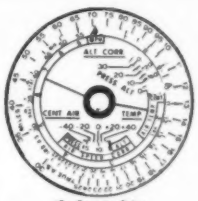

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COMMANDO CLASSROOM

YOUNGSTERS in Weed Patch, Calif., don't have to be coaxed to go to school. They *want* to go. And it's not very difficult to understand the reason why.

In addition to regular studies, students at the Sunset Elementary School, probably the most unusual grade school in the U.S., may choose courses in which they are particularly interested—and high on the elective list, along with art, drama, sewing and typing, is an exciting aviation course.

A 1,500-ft. dirt airstrip forms the campus for the boys studying aviation and a silver Curtiss *Commando* serves as their classroom. Sitting in bucket seats, the fifth to eighth graders study different types of aircraft engines, learn elementary theories of flight, traffic control, simple navigation, runway and plane operation and other aeronautical subjects.

Two AT-6 advanced trainers and one Fairchild primary trainer are also used as "workshops."

Incidental intelligence: "truancy rates have dropped to one half of one per cent" in Weed Patch.

I had just about completed my preparation for a private license, when I decided to try a few beach landings. I owned a Fairchild KR-21 biplane and had 30 hours of solo flight from Municipal Airport, Atlantic City, N. J. My instructor knew the ground looping tendencies of the KR-21. When I insisted on the beach landings, he chose a nice, long, sandy strip at Little Beach Island, about 10 miles north of Atlantic City. I knew other pilots had landed there and I was anxious to get out of the boring flight pattern around the airport for an hour or more. My instructor (now a CAA examiner) hopped into the front cockpit (no brakes) and we taxied out for the take-off. A few minutes later we were looking down at Little Beach from an altitude of 500 feet. Jack pulled the throttle back and told me to try one. When I approached the beach, which ran in a northeasterly and southwesterly direction, two things were quickly apparent. The beach sloped off sharply toward the ocean, and the wind was from the right, about 30° off the nose. Jack shouted to set her down near the water, where the sand was hard. He also yelled a warning about the crosswind. It looked like a cinch to me.

I made as nice a three pointer as I had ever accomplished back at the field. Everything was dandy, until the Fairchild started to slow down. It suddenly decided that a straight path was proving uninteresting and headed toward the ocean on our right. I kicked full left rudder, and felt Jack on the rudder with me, but the KR-21 had a mind of its own. The sloping beach and 20-mile wind from off the water were too much, and straight for the open sea we were headed. Jack hollered for left brake about the same time that I kicked it, but it was too late. We stopped when the bottom wing hit a wave, and I jumped out into the icy water. I wanted to save my plane. The sand was soft, and the wheels started to settle. Jack gunned the Kinner, which was still running (sometimes the engine will quit during a ground loop). I lifted under one wing as the waves receded momentarily, and with a sudden leap, the little biplane broke loose from the soft sand and spurted for harder ground. Net result, my $850 investment was saved. My shoes and trousers were ruined, along with my pride.

I had to pay a mechanic for pulling gear and fittings off for cleaning and greasing. Salt water can certainly corrode things. It was a cheap lesson.

The wingtip stall and quick pay off during landings are two more "hot" plane characteristics that give the super-ego pilot a chance to lord it over the novice. The wingtip stall caused by air burbles has been partially overcome by wing slots. Even some of our lightplanes are equipped with these slots.

If you are in doubt about a plane's stall characteristics, take it up high and land a few times at 3,000 feet. Some planes will hang on well, others will sell out in a hurry during a landing. If you level off too high, this type of plane will hit quite hard. To avoid falling out of a landing stall, or a wingtip stall, come in a little fast and fly the plane right on to the runway with power. That's all the superman can do, and once you know the secret, flying that hot plane will be just as easy for you as it is for him.

If you ever have to fly a ground lubber, an underpowered plane that takes a long run to get off, use all the field available. Sometimes it is wiser to choose a runway crosswind, if it is longer and offers fewer obstructions to be cleared at the far end of the field. Holding full brakes and revving the engine to full take-off power will also aid a shorter take-off. If the ship is equipped with flaps, begin your take-off run without flaps but drop one half flap just as you are ready to pull the plane off. Flaps lowered during the take-off run will hinder your acceleration, but they will increase your climbing angle if used at the end of the take-off run. A little practice will show you whether it is best to take off from a three point, tail low, or wheel position. This varies with different aircraft.

I hope you will never find yourself spinning in a plane that recovers poorly. Some planes fail to meet the hands off recovery requirements of the CAA.

One model of the Stearman J-5 biplane falls into this category. A good friend of mine, today an airline captain, once found himself in an accidental spin. The Stearman J-5 was new at the time, and the CAA spin restriction had not yet been imposed. My friend pushed stick forward and kicked opposite rudder, but nothing happened. If anything, the Stearman just wound up even faster. Finally, in desperation, as he neared 2,000 feet and completed eight turns, Corny pushed the stick into the inside forward corner (into spin direction). He blasted the engine and kicked full opposite rudder. The Stearman shuddered, hesitated, and recovered from the spin. Remember the procedure if you are ever in trouble during spin recovery.

I have heard pilots boastfully relate tales of their exploits with poor spinning planes. Fortunately for all concerned, they never offer to demonstrate their point.

If any one, boastfully or otherwise, tells you about some plane's poor spinning characteristics, take his word for it. It is a simple matter to check with your CAA examiner. He can give you a list of all notorious spinners. But if some swellheaded pilot tries to tell you how good he is at handling a fast-landing plane, or a ground looper or a ground lubber, just keep in mind that if he can fly it, so can you. END

Airborne Invasion

(*Continued from page* 19)

hours on the 9th and flew under fighter protection until darkness. They too, and again because of the wind, missed the check point at Malta. Continued high winds, together with navigational difficulties along a complicated course running from Malta north to Sicily, west to below Gela, and then north to the drop zones, caused such delay that the planes approached the drop zones in almost complete darkness and were unable to pick out the final check points.

Fires and smoke resulting from earlier bombardment by Allied planes further obscured the drop zones, and the paratroopers were dropped over widely scattered areas. Even so, enough of them landed near the objective to carry out the primary mission of seizing the high ground and road junction east of Gela.

Others, who landed beyond the easternmost point of the American ground forces, captured the town of Marina di Ragusa and soon made contact with the U. S. 45th Division. The aggressive action of the paratroopers, together with the surprise of an enemy who apparently had not anticipated large-scale airborne operations, adversely affected the morale of the Italian soldiers, some of whom withdrew as much as 10 miles.

Both LADBROKE and HUSKY NO. 1 were accompanied by diversions. B-17's, especially fitted with devices to obstruct enemy RDF, were over Sicily during the operations. Hundreds of paratroop dummies dropped by Allied planes were believed to have added to the enemy's confusion. Diversionary bombing missions employing incendiaries also proved effective, although in HUSKY NO. 1 the fires and smoke which they produced interfered with accurate dropping of the paratroopers.

In an attempt to send assistance to hard pressed Allied troops around Gela, a third airborne mission (HUSKY NO. 2) was flown on the night of July 11. The 52nd Troop Carrier Wing provided 144 C-47's which took off from Tunisian fields with approximately 2,000 paratroopers of the 504th Regimental Combat Team. Taking the same complicated course previously traveled by HUSKY NO. 1, the mission faced the additional hazard of traversing the actual battlefront for a distance of some 35 miles.

It faced, too, equal if less well-understood dangers. For the decision to mount the operation had been made hurriedly on the very day of its execution, and insufficient time had been allowed for warning Allied naval vessels along the route. Too late it was learned that a safety corridor had not been cleared and that the enemy had retaken the drop zone at the Gela/Farello airport.

Allied naval and merchant vessels brought heavy fire to bear on the planes as they approached Sicily. Near Marina di Ragusa shore batteries opened fire, and with both friend and foe combining their efforts, the corridor to the drop zone "became alive with deadly machine gun fire and heavy flak."

Over the drop zone some of the pilots refused to drop, feeling that it would be murderous to do so; other pilots, their formations having been broken by the intense fire, scattered the paratroopers from Gela to the east coast. And then, as if to add a full measure, some of the returning planes remained under fire for as much as 20 minutes after they left Sicily.

Losses were heavy. Twenty-three aircraft failed to return and over half of those which did reach home were badly damaged. Nor were the paratroopers able to accomplish their mission. Their unheralded descent at widely scattered points caused confusion. Allied troops were alerted against German parachutists —the 1st Division even carried the 504th Regimental Combat Team as an unidentified enemy parachute regiment in its G-2 report—and there were encounters between Allied airborne and ground troops.

As a result the 504th suffered heavy casualties which General Eisenhower considered to be "in excess of any real damage inflicted on the enemy." On July 14 the 504th and 505th were assembled near Gela, reinforced by an infantry regimental combat team, and assigned artillery support. Thereafter they acted as an infantry unit on the extreme left of the American sector.

Despite the unhappy experience with HUSKY NO. 2, it was decided to attempt one more large-scale airborne operation. Flown on the night of July 13 and coded FUSTIAN, it had the objective of taking Primasole bridge over the Simeto River north of Lentini which provided the only good exit for the British forces from the high ground into the Catania plain. Again, the mission was set up late, the safety corridor was not properly cleared (although Troop Carrier had every reason to believe that it had been), and the planes ran into heavy fire from Allied naval vessels as well as from friendly and hostile shore batteries.

Of the 124 aircraft which flew the mission, 50 were damaged and 11 destroyed by friendly fire, while another 27 were forced by flak to return with full or partial loads. Even so, the British paratroopers dropped close enough to the objective to seize the bridge, remove its demolition charges, and hold on until the ground forces took possession on the morning of July 14.

In retrospect, three of the four major airborne operations could be regarded as tactically successful. General Patton declared that the action of the 82nd Airborne Division near Gela on D-day had speeded up the advance of his 7th army by at least 48 hours. General Alexander said that the early capture of Syracuse was "largely due" to the airborne troops, while Montgomery estimated that airborne troops dropped in front of the 8th Army had accelerated its advance by as much as a week.

The total loss in planes of 42 aircraft out of the 666 troop carrier sorties flown was perhaps not too high a price to pay

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for these accomplishments. But there was cause for serious dissatisfaction in the fact that perhaps 25 of the 42 aircraft had been shot down by friendly naval and ground fire and that some 60 per cent of the 5,000 paratroopers carried had landed far from their drop zones. Whatever the tactical success achieved on three of the missions, the remaining one had ended in complete failure and none of the missions had been satisfactory from a technical or operational point of view.

British Air Marshal Coningham felt that the operations had been handled rather amateurishly, that they had been a "soldier's air operation" rather than an airman's. Spaatz, writing to General Arnold immediately after FUSTIAN, declared that the missions had demonstrated that parachute and glider operations could be conducted without excessive losses only if surprise were obtained, that airborne troops could not be dropped into an organized battle position without incurring heavy losses, and that mutual training in identification must be thorough.

General Eisenhower was in full agreement with Spaatz and, as soon as possible after the invasion of Sicily, he took steps to review the airborne missions in order that the experiences and lessons might be put to use in future operations. Staff officers of Troop Carrier Command and of airborne headquarters prepared critiques covering various phases of the problem, and on July 23, Eisenhower appointed a board of officers for a special study which on completion served as the basis for a training memorandum circulated to all Allied forces in the theater.

These investigations led to the conclusion that airborne troops should be employed only on missions suited to their role, and then only when the task could not be accomplished by "other means more economical or equally well suited to the mission." All ground and naval forces should be notified of planned operations well in advance, 12 hours being considered a desirable minimum. The final decision as to whether an operation should be carried out must rest with the air commander in chief, since every feature of the mission—such as fighter protection and routing—was an air matter until after the drop had been made.

Planning should be centralized in one headquarters; and the carrying agency should be under the direct control of the air commander in chief in order to simplify problems of command and communications. In planning all airborne missions involving over-water flights, provision must be made for keeping surface vessels as far as possible out of a safety corridor of approximately five miles on either side of the route of flight. At the same time, however, aircrews must be warned of the great vulnerability of surface vessels to air attack and made to realize that naval vessels could not afford to accept the presence of aircraft in their vicinity unless the planes positively identified themselves as friendly.

Finally, realistic and thorough training for air force and airborne troops in combination was required, with special attention given to training in low-level navigation at night and to the proper use of recognition signals. Where possible, the preparatory training should culminate in a rehearsal of the operation under conditions simulating the actual battle.

These conclusions emphasized the basic faults in the execution of the HUSKY missions, but they also pointed the way to the highly successful airborne operations later to be staged in the invasions of Italy and Normandy.

That problems always develop in airborne operations, however, can be seen from reports of operations in September, after the invasion of Italy. The Allied ground situation had deteriorated on September 13, and Northwest African Air Force threw its full strength in close support of the Fifth Army. Its first task was to fly in troops to strengthen VI Corps. Three missions were set up: two of them involved drops immediately behind VI Corps, while the third was a drop near Avelino for the purpose of disrupting the movement of German troops southward.

"And There I Was . . ."

RED LIGHT

As the B-17 lifted slowly off the runway on a night transition flight, the instructor saw a red light directly ahead.

"Look out!" he yelled to the startled student. "There's another plane right in front of us. Get under it. Quick!"

The student's reactions were superb. He followed orders—and crashed into a radio shack at the end of the runway. The B-17 and shack were demolished—but no one was hurt.

It took a long time to convince the instructor that the "other plane" was the radio shack's red obstruction light.

MERVIN ROLAND

The first mission, coded GIANT I (Revised), was set up on a few hours' notice. The 51st and 52nd Troop Carrier Wings were informed of the mission at 1330 hours on the 13th, orders for the mission to be carried out were issued at 1830 hours, and the first planes took off at 1930. The improved techniques over Operation HUSKY are noteworthy.

Three Pathfinders led the way. They dropped 50 paratroopers, Rebecca-Eureka beacons, Kypton lamps, and handie-talkies squarely on the drop zone 3.5 miles south of the Sele River. Within three minutes the Rebecca-Eurekas were in operation. Fifteen minutes later 82 C-47's and C-53's of the 61st, 313th, and 314th Troop Carrier Groups began coming in from Comiso and Trapani/Milo, Sicily, most of them homing on the Eurekas, to drop the paratroopers of the 504th Regiment of the U. S. 82nd Airborne Division.

The bulk of the troops landed within 200 yards of the drop zone and all were within one mile except B Company of the First Battalion, which landed eight to 10 miles southeast. Not a plane nor a man was lost and only one man was injured, although more than 600 men were dropped. The paratroopers were taken by truck to a point near Albanella. After helping to stop the German advance, they went over to the offensive on the 17th and took Altavilla.

The following night, Troop Carrier flew GIANT IV, when 120 planes dropped 1,900 men of the 505th Regiment with their equipment on the same drop zone that had been used for GIANT I (Revised). The mission was highly successful, all except some 40 men landing within 1½ miles of the DZ. Trucks took the men to Agropoli, Ogliastro, and Capaccio where they relieved the service troops and beach engineers who had been pressed into service for a possible last ditch stand, and a part of the tired and battered 45th Division which had been in the line since the landings.

The third mission, known as GIANT III or AVALANCHE Drop, was flown the same night to a point near Avellino but was less successful. The range of the radio transmitter and the Aldis lamps which the Pathfinder force set up was so limited that only a few of the aircraft received homing indications. High hills around the DZ probably further shortened the range, while the planes found it difficult to pick out the drop zone because of similarity in topography.

Because of the mountains around Avellino the drops had to be made from heights ranging from 3,000 to 5,000 feet (as compared with about 600 near Paestum), which made pinpointing impossible. Of the 40 planes of the 64th Troop Carrier participating, only 15 dropped their men near the DZ. The remainder of the 600 troops landed from eight to 25 miles away. They came down in small scattered groups and in woodlands and vineyards which made assembly difficult. Most of their equipment was lost.

Only a small force, with limited equipment, reached Avellino where it blew a hole in the main highway bridge and then took to the hills, as did the other groups. After waiting several days for the arrival of the Fifth Army, the scattered elements moved south and bit by bit made contact with the Allies. On October 8, 118 of the 600 who had been dropped were still listed as captured or missing.

In Washington, General Marshall was far from satisfied with the results of the airborne operations in Sicily and Italy. He felt that the Allies were not using to the fullest the facilities at their disposal, and that the Sicilian and Italian campaigns "might have developed very differently if we had been in a position to handle simultaneously more than one airborne division." He and Arnold agreed that the Germans were particularly afraid of airborne operations and that such missions would be of immense value in OVERLORD (invasion of France). In November it was decided to transfer most of the airborne troops from the Mediterranean to the United Kingdom for use in OVERLORD. END

GI Bill

(*Continued from page* 35)

easier approvals. They oversold, and in some cases missold students and caused VA mistakenly to believe that a large portion of GI flight time was flying for fun.

One rotten apple can give a whole barrel a bad odor. VA had a responsibility to the taxpayer and to the veteran, and the vocational-use standards its officials fixed were severe. It seems only fair to state that the average VA official has been trying to do an honest job of interpreting the law and the regulations. There has been some lack of aviation understanding but that can be explained by the fact that 6,000,000 GI's had up to June 30 taken education or training courses ranging all the way from agriculture to undertaking. Even a VA man can't be expert in everything.

Parenthetically, it might not be amiss to say that most of the headaches in GI Flight for VA, veterans and schools alike, could have been avoided if the Government agency had gotten the benefit of a training advisory committee consisting of competent, experienced aviation educators. The idea still is valid with regard to private schools as a whole, but particularly so as regards aviation training where only men with industry background and industry contacts can know real trends and probabilities.

There is no point in recounting in detail the GI program's recent legislative history. In general, VA has felt that it should have power to decide whether training, particularly in private schools, is avocational. The Veterans Administration's Instruction No. 1, issued in the summer of 1948, listed certain types of training such as dance instruction, mixicology and certain musical courses in proprietary schools as avocational. In the case of flight instruction, it demanded rather complete justification that flight courses would be used occupationally.

The effort to screen out trainees who VA believed wished the course for avocational rather than vocational use was based on Congressional action which decreed that Government funds should not be expended for avocational training in private institutions. While the Brooks amendment sought to spell out absolutely the right of the veteran to take flight training if he proposed to use it in connection with his present or contemplated business or occupation, VA's interpretation of what Congress had said resulted in GI training tapering off sharply beginning in mid-summer 1948. In the 13 months ended July 31, 1949, VA had reviewed 56,640 applications for flight training and had approved 30,789 without advisement. After advisement another 4,193 were okayed. While exact figures on totals are not available, it appears that nearly 450,000 have obtained some flight training under the GI Bill since it was passed.

What then are the prospects for Flight Training for the six million or more GI's who have not used any of the entitlements granted them by the Veterans Readjustment Act? There is no doubt that the legislation enacted by Congress this summer places GI Flight Training on a firmer basis than it has been since the spring of 1948.

Under the leadership of men like Senators Elmer Thomas, (D) Oklahoma, and Robert A. Taft, (R) Ohio, Congress determined to end an era of misunderstanding. The legislation passed indicates that what has been forged by Congress is a better, more workable product than that turned out in the summer of 1948. As applied to flight training, here is the way the situation appears:

Veterans will not have too much trouble getting VA approval for flight instructor, instrument rating, multi-engine or airline transport courses if they have a valid commercial pilot's course and their medical certificates are in order to obtain the license or certificate for which the course is taken.

VA will not regard an elementary flight, private pilot or commercial pilot course as avocational if the veteran provides an affidavit supported by adequate corroborating affidavits from two competent disinterested parties that such training will be useful to him in earning a livelihood. There will no doubt be variations of interpretation in different regions as to what will be regarded as adequate documentation.

Several things however are sure. "Competent disinterested persons" does *not* mean members of the veteran's family, or employees or owners of flight schools. Employers or prospective employers of the veteran? It's not been ruled on yet but our guess is that VA will be inclined to take the word of solid, responsible employers as valid.

There's nothing to keep boys who were turned down last year under the "complete justification" generally demanded then for flight enrollment from getting their affidavits and trying again.

Veterans, however, must get proper approvals before entering into training. No payments for subsistence allowance or tuition will be authorized by VA for any period prior to the date of such approval.

While the foregoing statements are applicable to veterans who are taking training for the first time, the task of getting approvals is harder for veterans who have dropped out of given courses earlier or desire to take training of another sort than that for which they originally had been enrolled.

This means that for a veteran who has completed a course of training and desires an additional course, this new course will be considered avocational or recreational unless he submits "complete justification that the course is essential to his employment." Likewise for any veteran who has dropped a course either on his

END

own volition or because his progress was unsatisfactory, there must be established complete justification that the course desired is essential to his employment. In every case, of course, the veteran must establish the fact that he is eligible to take training and that VA has given its approval before the veteran either enters or re-enters training.

The new law also provides that VA may not expend money for tuition in schools which have been in operation less than a year unless such enrollment was made earlier than August 24, 1949. There has been considerable misunderstanding as to what this means. The writer is not a lawyer, but our understanding is that in determining whether a school has been in operation for a period of less than one year, the effective date of operation will be the date on which a full schedule of instruction was commenced by the school to a minimum of 25 students from which the school collected tuition.

From the foregoing, it appears that VA's current instructions and interpretations bear down hardest on boys who desire repeat courses and on the new schools. Congress has not adjourned and new schools may attempt to get the law changed and court tests on any part of the new interpretations are always a possibility, even if the facts are that few persons have ever gotten rich by suing Uncle Sam.

What is the volume of GI flight training likely to be in the year ahead? It is this observer's guess that total enrollments for the year ended June 30, 1950, may run 50,000 to 60,000.

For the GI who is going to take flight training we have one word of advice. In selecting a school pick a good one, not one of the few rotten apples. If you are planning flight training in your own neighborhood select a school that is a good clean operation with a good local reputation. Pick one where maintenance standards are high and the management and instructors experienced.

If you are going to make aviation your career check the industry connections of the school before you enroll. Learn its placement record, its standing among recognized old timers of the aviation business. If a school has been advertising in a publication like FLYING or other of the recognized aviation publications for years, you can be sure such a school does a good job year in, year out. END

Fairchild T-31

(*Continued from page 25*)

tapering back. The pilot knows that if the little wheel lever is down, the big wheels are down. There can be no confusion with, for instance, the flap control. Wherever practical this plan is carried out.

2. The control should be placed as nearly as possible in a position in the cockpit to correspond with the position of the part of the plane it controls. For instance, the landing gear lever is, whenever possible, to be placed directly over one wheel of the plane, and the flap lever is back in line with the wing flaps.

3. The control should move in the same direction and through the same arc as the part to be operated.

4. To turn controls on or to increase them, push them up and forward. Switches are turned clockwise for on, counterclockwise for off. There are exceptions to the up for on and down for off system, such as the flap, landing gear and arresting hook lever (on the XNQ) which are pushed up for up and down for down. The reason is obvious.

5. The pilot should be required to actuate controls only once to accomplish the desired work.

The T-31 has many other unusual features. It has a single-control rudder pedal adjustment which permits adjustment of both pedals simultaneously. No indicator is necessary—the pilot performs the adjustment rapidly and by feel.

All electrical switches are grouped on the right side of the cockpit. Circuit breaker switches pop out and are easy to push back in. All engine controls are grouped on the pilot's left.

Indirect red lights are used for illumination instead of fluorescent lighting. The pilot can look at a red light on his instrument panel and transfer his gaze into the night sky with virtually no adjustment of his pupils. Colored knobs are not used for engine controls because they are believed to be confusing.

FLYING

"Now in this model the gunner rides in front!"

North American's T-28 advanced trainer will incorporate a cockpit arrangement similar to the T-31. The first combat-type aircraft to have the functional installation is the Douglas *Skyraider* (AD-1).

The T-31 has 16 instruments on its panel. They are altimeter, attitude gyro, directional gyro and compass, rate of climb, turn and bank, accelerometer, manifold pressure, oil pressure and cylinder head temperature gauges, clock, wheel and flap indicators, fuel gauge, tachometer, outside air temperature gauge, airspeed indicator and voltammeter. The flight instruments are in the center of the front panel, enclosed by a white boundary line, and the engine and other instruments are grouped around them.

The T-31 has a maximum speed of 166 m.p.h. at sea level, and a cruising speed at 65 per cent normal rated power of 142 m.p.h. Initial rate of climb is 1,070 feet per minute, and service ceiling is 19,500 feet. Endurance at 90 per cent high speed is 4.7 hours on the plane's 80-gallon fuel capacity. Maximum range is 900 miles at 110 m.p.h. Take-off run is 610 feet and take-off distance to clear 50-foot obstacle is 1,190 feet.

The plane weighs 2,817 pounds empty, and 3,750 pounds fully loaded. It has a span of 41 ft. 4 in., length of 27 ft. 11 in. and height of 9 ft. 10 in. It is powered by one Lycoming R-680-13 nine-cylinder radial engine with normal rating of 280 h.p. and 295 h.p. available for take-off. It has a constant-speed two-bladed propeller.

The basic aim of cockpit standardization, which makes the T-31 so distinctive, is to eliminate all the things that interfere with a pilot's natural operation of the controls. Everything not necessary for the pilot to see in the cockpit is concealed. Widespread adoption of the standardized cockpit arrangement would permit all pilots to attack their flight problems with greater safety and confidence. One important move in that direction for civil pilots is the CAA's recent cockpit standardization proposal for new airliners. Private pilots will be better off when the same move gets underway for them. END

The Air Guard

(*Continued from page 29*)

landed every 30 seconds. One time we had over 80 planes in the area waiting to land. And adding to the congestion, gunnery planes had to taxi to take-off runway, wait for armament men to charge their 50-cal. guns, and then take off. After they flew their missions, they had to stop at the end of the runway to have their guns cleared before taxiing back to the parking ramp. That precaution kept runaway guns from annihilating the 71st Wing—but it kept the taxi strips clogged.

While we faced these problems on the ground, we also had others. Some squadrons were working interception problems with Aircraft Control and Warning units. These squadrons had to line up 12 planes on take-off runway with pilots sitting in the cockpits and ground crewmen standing by with fire extinguishers, waiting for a flare signal from the tower telling them to take off.

As I said, things sometimes got a little snafued.

To cope with the situation, we used as many as three intersecting runways at once. Control operators needed five heads and 15 hands to keep the traffic moving, and we all wasted time sitting on the runways waiting for a cross runway to clear so we could take off. By the second week, though, the tower boys had learned to shuffle the planes into the field with more efficiency. We pilots had learned to plan things a little better. And things began to click.

That first week, everyone was pointing toward the Operational Readiness Test, conducted by the Air Force during the first four days of the second week. The Air Force checked our records, training status, mess, maintenance and operations —everything. Then they came up with an evaluation of our status. Their report indicated just how well we are qualified to fight a war with the men and equipment we now have.

We were handicapped because we didn't have all the planes we were authorized. Also, several pilots were new to the squadron and didn't have their instrument cards. Individually, we were all fairly proficient pilots, but we had to get used to flying with each other. We all saw wartime service in different theatres, where we used different combat formations and tactics. None of us had much gunnery, bombing or rocket practice after the war ended.

During the Operational Readiness Test that second week, the 71st Wing had to operate with all five squadrons. Personally, I never flew with more than 16 planes during the war because we never had more than one squadron of combat-worthy fighters in the 13th Air Force at one time. Another pilot, Clyde George, was a former night fighter, used to flying alone or with one other plane. Two of the boys, Warren Saetre and Lyle Overson, spent their overseas tours in Panama where they occasionally flew with large show formations.

We all had to learn to fly mass combat missions—and we had a lot to learn.

After our first day's practice, Operations gave us the word gently. The 109th needs more practice, they said. One of our best pilots dropped one bomb so far out of the area the ground spotters couldn't even see where it went. (The next day we had fun with a headline on the front page of the Chicago Sun-Times which read: "MYSTERY BOMB HITS HOME HERE.")

The only pilot who did spectacularly well that first day was Bill Owen, a former Marine who repented the errors of his youth and joined the Guard. Bill got two direct hits—with his two bombs.

We were just about as bad on ground gunnery. The pilots who did the best jobs in combat seemed to be poorest on the first missions. Ken Dahlberg, Minnesota's top living ace with 15 Jerries to tell his grandkids about, got only one hit in a six-foot target with 200 rounds. That's one story the grandkids won't hear from Ken. (It really wasn't Ken's fault; a low ceiling with a bad haze underneath obscured the target until the last minute.)

It took us only a couple of missions to dope out our mistakes. Then we were able to do a better briefing job. After a chalk talk by our Air Force instructors, Lieut. Col. J. B. Morehead and Maj. T. E. Markham, our eyes were opened—and the next missions were better. In fact, during the Operational Readiness Test my flight got the best score of the entire summer, according to the range officer. I can only bask in reflected glory, but Emil Possis, who learned his gunnery in Panama, got 122 hits before his guns jammed. A. G. Johnson and Lyle Moore got 67 and 64, although they weren't able to fire all their rounds. I did half as well—but, then, I fired all 200 of my rounds.

We didn't do so well on aerial gunnery. Bad weather forced cancellation of several missions. Then the tow-slip had trouble and couldn't tow. Another time, the tower went out and couldn't give drop instructions, and the target landed in a swamp. So during the O.R.T., we were judged on our passes and not on our scores.

We were also graded during O.R.T. on another type of mission—interception of "enemy" bombers or photo planes at high altitude. Theoretically, the ground controller was to locate the enemy by radar and vector us to his position. But we didn't have any radar. To get around this difficulty, we supplied a couple of planes to act as bogeys. The bogeys were briefed separately as to where they were to be, and at what time. Then we were dispatched to the spot where the bogeys were supposed to be.

As the alert squadron, we sat in our planes, all buttoned in, on the runway. When the controller wanted us to take off, he sent a message to the tower. The tower shot a yellow flare. In the planes, we had all our tabs and instruments set, and all our switches except the battery-switch on.

When we saw the flare, we flicked the battery switch, hit the starter and cranked up. The tower stopped all traffic on other runways—except for emergency landings—until we were airborne.

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mission, the controller sent us to 32,000 feet, vector 110° to Milwaukee.

We arrived over Milwaukee at our assigned altitude with eight F-51's. In a few minutes, Gene Whyte, leading the second flight, spotted the bogeys and dived on them. I turned but couldn't see them. After a couple of minutes I called Gene for his position: 28,000 feet over Billy Mitchell field. By the time we dived down, the mission was accomplished, the bogey was gone. We rejoined with Whyte's flight and returned to Williams.

A few minutes later at the critique, our bogey flight and the Wing pilots who were observing and flying with our bogeys both claimed *they had shot down my flight and me in particular.* It was peculiar that they had shot me down at 29,000 feet when I thought we were at 32,000. Then Whyte said he saw another flight make a pass at the bogeys and that he had thought we beat him down to the target. At this point the four of us in my flight began to suspect that someone else was over Milwaukee at the time.

Everyone laughed at the idea. They thought we didn't want to admit we were shot down. Many barbed quips were tossed our way. It seemed ridiculous to think anyone would be flying around at 29,000 feet just for the heck of it.

A couple of days later Wing headquarters received a report from the Grayling, Mich., squadron that one of their flights had been tapped over Milwaukee at the time and altitude of our mission. It goes to show what can happen when enemy bombers, photo ships and friendly fighters are all F-51's.

The majority of officers in the Guard units are war veterans. Many have taken a downgrade or two in rank as well as given up their reserve commissions in order to fly tactical aircraft or work with a genuinely tactical unit.

Each unit is held together by a responsible core of highly trained, war-seasoned N.C.O.'s in key jobs, but most enlisted men are young recruits whose midweek drills and summer camps have given them their only military training. Most outfits are not up to 100 per cent strength in enlisted men; this naturally puts a strain on maintenance, communications, supply, armament and other ground sections.

This year between June 11 and August 28, the Air Guard carried on the most extensive field training maneuvers in its history. This year for the first time training was almost completely on a Wing basis. Altogether about 40,000 Guardsmen from some 500 tactical and technical units learned or relearned how to live and fight together. They flew Lockheed F-80 jets, F-51's and F-47's, Douglas B-26's, and (to maintain supply and administrative lines) the old reliable C-47.

All Guard units down to squadron level are assigned permanent Air Force instructors. They have no command function; they act only as advisors. They came along to camp to help us, and to help the Air Force and 10th Air Force Operational Readiness Test inspection teams check other units.

This summer the Air Force gave all Guard units the same O.R.T. the regular Air Force units take. They wanted to find out what we could do in case of war.

Operating as Wings, rather than as squadrons as always before, called for minute planning and coordination at wing, group and squadron levels. There were errors of omission and commission at all levels, but the holes were plugged in a hurry. After operating together for only a week things began to shape up.

CAUSE FOR COMPLAINT

PILOTS who think *they* have problems will change their minds when they read the following letter. It was written on July 25, 1913, to the Navy Department by Lieut. Alfred A. Cunningham, first Marine Corps aviator.

Sirs: My flying machine, as Mr. Towers [later Admiral John Towers] probably has told you, is not in my opinion fit for use. I built it from parts of the Burgess F and Wright B which are not exactly alike, and nothing fitted. I had to cut off and patch up parts and bore additional holes in beams to make them fit.

The engine bed, made by Burgess, was not exactly square with the front beam, so the engine had to be mounted a little out of true. I have made more than 200 flights in this machine and recently, in spite of the unusual care of myself and men, something seems to vibrate loose or off a majority of the flights made. One of the propeller shafts is the same one used with the gyro motor on the old machine. It is the only left hand shaft here. While the engine runs smoothly, it does not deliver nearly as much power as when it was newer, and even then it did not have enough power to fly in any but smooth weather.

It is impossible to climb over a few hundred feet with a passenger. The whole machine has just about served its usefulness and I would like very much to have a new machine of the single propeller type. Lieutenant Arnold [later Gen. H. H. "Hap" Arnold] of the Army, after seeing the machine run and examining it, said that none of the Army fliers would go up in it.

Will you let me know what the prospects are for my getting a new machine?

At that time, it would appear that the Army, Navy and Marine Corps were in complete agreement on air power.

G. R. HUNTER

At our camp, by the third day of the second week we had it licked. Everything worked out according to blueprint.

We took off that third day at 7 a.m. for dive-bombing, rocket shooting and ground gunnery practice.

Most of us had never fired rockets before, but every one got at least a couple of hits out of six—and we all learned where you have to aim. Dive bombing passes were all good and the ground spotters reported many direct hits and more near misses. Air-to-ground gunnery showed the results of a week's practice and better briefing. The squadron average was the best of any on the field.

In the afternoon, three interception missions all went off without a hitch.

That evening we had a stirringly realistic "combat situation" briefing by the group intelligence officer, telling about an expected attack just before dark by enemy bombers from Greenland.

We went out grimly determined to defend Milwaukee's vital breweries. We took off and formed 14 F-51's in the speediest join-up I've seen since the war. After patrolling Milwaukee at 20,000 feet until dark, we came back and landed. It was one of those dark nights with a nasty haze below 6,000 feet—black as a gun barrel. Thanks to Barney Wilson's flawless leading and the fact that the 10 wingmen and element leaders flew the best night, close formation I've ever seen, everything went according to plan.

The next day we provided 16 planes and pilots as our part of a Wing mission. Eight F-51's from another squadron flew with external drop tanks and acted as bombers. More than 50 other fighters gave them cover. Four-plane flights took off at two-minute intervals and simulated climbing through an overcast to rendezvous at 20,000 feet over Green Bay. The rendezvous worked out as planned and the mass formation continued to the target and returned without incident. Ironically, the weather turned out much like we were "pretending" instead of as it had been forecast. As a result, the "bombers" had to go down under the overcast instead of over it.

On Friday, August 26, the entire Wing flew a massive review over Camp Williams. Then Colonel Dolny, our group commander, led 80 F-51's to the Twin Cities. Over the cities we pushed up to full power settings to clean out our engines—and to make enough racket so everyone would know we were there. While we were gone, an aerobatic team of four F-51's from the St. Louis squadron put on a show.

On the way back to Williams each group was supposed to use a different power setting to space the arrivals far enough to permit each group to land before the next one got back.

As the lead group, we arrived first and gave the field a mild buzz, displaying some beautiful show formation. Either because they have faster airplanes or because they wanted to put on a slight show too, one Iowa squadron got back just a few seconds after we did.

Saturday we got pay and typhoid shots, took naps and APC pills, and sat in on a critique to find out how we did on the O.R.T. The point scores were classified "secret"—but rumor had it we got the highest score on the field—by a couple of points.

Sunday morning we flew home with sore arms and full wallets, convinced we could still fight a war if we had to. Our children welcomed us home happily, expecting souvenir gifts. And even our wives were gay, having convinced themselves that a vacation wasn't as much fun as spending our ANG pay. END

Thunderstorms

(*Continued from page 23*)

downdraft and the upper part contains drafts of negligible velocities. For more detail on these three stages, see last month's issue of FLYING.

Lightplane pilots are not going to fly inside thunderstorms, where the most severe updrafts and downdrafts are, unless they happen to be very unlucky. But they are greatly concerned with downdrafts under the cloud base. Strangely enough, it is the secondary effect of turbulence in the downdraft, rather than the chance that it will carry them into the ground, that should be the biggest worry of pilots flying and landing contact.

When the cold downdraft of a mature thunderstorm cell reaches the surface of the earth, it spreads out in all directions like a jet of water directed against a flat surface. It has more speed in the direction the storm is moving over the earth, for then the speed of the spreading air is added to the motion which the thunderstorm already has. The highest wind velocities therefore exist on the leading edge of the thunderstorm, and the lowest velocities on the trailing edge. The depth of this downpouring cold blanket of air varies from 1,000 to 5,000 feet above the surface but in most cases, the outspreading stratum of air is restricted to the lowest 2,000 feet.

The cold air moving in advance of the thunderstorm is caused by the downdraft, which in turn is caused by the rain. It comes suddenly and can cause a sharp increase in wind speeds within a few seconds. This sudden increase of wind ahead of a thunderstorm is familiar to everyone, and can be called the "gust line," or "first gust." It is dangerous because it can stall an airplane out, especially on the landing approach.

The gust line marks the first major gust of a varying period of high gusty winds. Wind speeds can reach over 60 m.p.h. and the change in wind direction can be a full 180°.

An understanding of the thunderstorm downdraft and the gust line is of enormous importance to pilots. Sometimes they will be landing away from the approach path of the storm into a slight wind which is inflowing toward the updraft of the approaching storm. They are flying near the stall when the gust line strikes. When it hits they're in trouble. The wind switch can be sudden enough so that they are landing or taking off cross-wind or even downwind without their knowing it. The wind can always shift after the pilot has observed the wind sock.

Equally common is the possibility of stalls due to turbulence when the plane is already flying near the stalling speed. It is a common thing for pilots to encounter enough turbulence to cause a 40 m.p.h. wind change in 400 to 600 feet of flying.

Any pilot who isn't paying attention can get in trouble when a gust line passes. Assume that a pilot is at the end of the runway, waiting for take-off away from the approaching storm. He is busy with his cockpit check and waiting for word from the tower. The gust line passes him without his even knowing it. Then, instead of taking off into a slight headwind or in a calm, he may actually be taking off with a strong downwind.

Even the wind sock may not show it until too late. The gust line which has passed the pilot may not yet have reached the wind sock or the tower. A pilot under such conditions eats up runway mighty fast. He may get a surge of lift when he outruns the gust line—and he may also not get off at all. Even transport pilots have been caught by this situation.

What happens to an airplane flying underneath a thunderstorm and meeting a downdraft?

It is unlikely that a downdraft from a single cell will extend more than three miles, and most of them are less than two miles in diameter. In a draft three miles in diameter, with a downward speed of 20 feet per second (a very strong downdraft) an airplane flying 90 m.p.h. would be displaced about 2,400 feet providing the pilot did not take corrective action. If he went into a nose-high attitude, climbing at the rate of 600 feet per minute (10 feet per second), and in so doing reduced his speed to 60 m.p.h., he would be displaced 1,800 feet. This would not be recommended, however, because of the danger of a gust causing a stall.

More than one draft may be encountered beneath a storm, although the studies of storm structure indicate that it is unlikely that two downdrafts will be separated by less than three miles. More important than the total altitude lost in a downdraft is the possibility that an airplane carried down over hilly country might not have a high enough rate of climb to clear obstacles in its path.

Based upon what has now been learned about thunderstorms, here are some of the rules lightplane pilots should follow:

1. Always fly contact. It shouldn't be necessary to elaborate on this. You want to live, don't you?

2. Fly around the storm if you can.

3. The least turbulence will be found in the zone from about the 4,000-foot level down to 2,000 to 3,000 feet above the ground. If you must fly through, go underneath at this level. While these downdrafts may exceed the rate of climb of a lightplane, it is unlikely they will carry a pilot to the ground.

4. Don't fly too low. The spreading cold air that causes the gust line is about 2,000 feet thick. At or below 500 feet above the ground, the turbulence may actually be more severe than inside the storm. After the cold air spreads out and the gust line passes, however, turbulence decreases.

5. Observe a caution period after the first gust. Gustiness and high wind speeds persist for an average of 15 to 20 minutes, but gustiness can last from two or three minutes to as long as 90 minutes.

6. Fly around rain areas—not through them. Formerly it was believed that the rain areas were relatively calm. This is now known to be false. The downdraft is caused by the rain and it is usually accompanied by heavy turbulence. Stay

END

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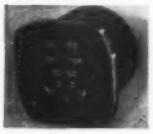

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out of the rain and maintain visual contact.

7. Don't try to hold altitude in extreme gustiness. Let the gusts or drafts carry you up or down. If loss or gain of altitude continues, be prepared to change power settings. But remember that a nose-high attitude may increase the likelihood of a stall, and a nose-down attitude, by increasing your plane's speed, increases the stress on the wings. If a wing kicks up, be cautious about levelling it out; leave it up—it'll usually roll back. Be cautious about all plane controls.

8. Be careful when you land. If you are at 3,000 feet or so, you are above the gust line. If you must land, you can often tell whether the gust line has passed. If the wind sock is straight out you will know that the line has passed and that you will fly through a high wind and turbulence on your approach.

9. Higher than normal landing speeds are demanded. A sudden wind shift may stall you out in a hurry if the gust line hasn't passed or if there is considerable turbulence.

10. The rule of 180 is still best. If you are going to sit down, make up your mind early. You should get out of the storm area to land. If you have to land, or are committed to land, remember that the direction of the wind is generally outward from the storm.

Where there's no tower it's pretty well up to the pilot what he's going to do. If he sees that thunderstorms are downwind from the airport he can ignore them 99 per cent of the time when landing. But if a storm is upwind of the airport, sooner or later the gust line of cold air is going to sweep across the runways.

If the windsock indicates a strong wind is blowing away from the storm, the cold air has already passed. If the sock is limp, the pilot will know that the cold air is going to pass and he should be prepared to encounter a cold air front, attended by strong winds blowing out from the storm, and turbulence. Accompanying the gust line, the surface wind increases from four to five m.p.h. to an average of 18 m.p.h. in a few seconds. *More than half of the Project's observations showed a first wind speed greater than 16 m.p.h.* Fewer than five per cent, however, showed speeds exceeding 30 m.p.h., although in one storm a first gust of 62 m.p.h. was recorded. The average change in wind direction associated with the first gust is 39°, but wind shifts of more than 90° occurred 12 per cent of the time.

Thunderstorm cells move in the same direction and speed as the winds aloft at 6,000 to 15,000 feet. The speed at which they move varies considerably, and it is impossible to predict unless the observer knows the speed of the winds aloft. The leading edge of the gust line travels 15 to 30 m.p.h. faster than the storm itself is moving. The speed seems to depend on the distance from the storm, the age of the storm, and how long it's been traveling.

The areas of highest water concentration are the areas of heaviest turbulence. This supports the growing conviction that radar can be used to avoid excessive turbulence in convective clouds. In flights below cloud bases, the heaviest turbulence will be found where the darkest rain columns are seen.

All evidence supports the effectiveness of ground radar observations. Towers equipped with radar can watch the approach of a storm. Intelligent use of radar can tell the control tower where the downdrafts are within the storm. From this, the tower can deduce the possibilities of the first gust passing over the airport.

Eventually there can be development of a thunderstorm warning service to all airports in the vicinity of a radar observation post, thunderstorm researchers believe. Here are some general conclusions which can aid radar operators in predicting the approximate direction of movement of the first gust line and direction of the first gust.

A. The winds behind the first gust blow out from the radar echo. If an echo within 10 or 15 miles of a station is seen to be moving or propagating directly toward it, the first gust is likely to arrive

LANDING ON A STRING

FOR THE FIRST time, a civil airport has been designed that will enable lightplanes to land in the most rugged kind of country. Brainchild of James H. Brodie who pioneered the wartime cable landing system, the aerial-track airport can be erected over hills, roads, gullies and other types of terrain which would be entirely unsuitable for ground runways.

Brodie feels that his cable airport is the ideal solution for small towns, industrial plants, ranches, farms, suburban taxi services and many other enterprises which need light air transportation but cannot afford to build an airfield. The device, which sells for $5,375 f.o.b. Baltimore, can be installed for an additional $500 and requires only one man to operate it. No excavating or surfacing is needed. Weather conditions (snow, ice, mud) don't diminish its utility. It can be used year-round without need for the expensive machinery ordinarily required for maintaining clear runways. No more pilot skill or training is needed to use it than is required to operate on ground runways, the inventor says.

Here's how the cable airport works:

The runway consists of a 600-foot steel cable supported by four heavy wood masts 60 feet high, positioned one at each corner of a rectangular area 760 feet by 160 feet. (The runway cable is connected at each end to a bridle cable which meets the runway cable in the shape of a Y.)

For landing (see above photo), a power-on approach is made just below and in line with the runway cable. As the plane flies between the masts at one end, a hook installed above the wings engages a large nylon rope sling which hangs below the cable. After engaging the sling, the plane pulls a trolley along the cable and is gently retarded until stopped within 350 feet by an automatic arresting unit.

After it stops, the plane hangs about 10 feet above the ground near the middle of the runway. It is then lowered to the ground by slackening the cable with a small winch. Pilot and passengers get in or out of the plane while it is on the ground.

For takeoff, the plane is raised off the ground, taxis to one end of the cable and is turned around to head along the length of the runway. The tail of the plane is then secured by a rope leading to a fixed anchor about 100 feet to the rear. After the pilot checks magnetos, he revs the engine to full power and releases the tail rope by tripping a release coupling. The plane, supported by the trolley, accelerates under its own power along the cable until it attains flying speed. At that moment the pilot releases the plane from the trolley by a control in the cockpit and the plane is in free flight. After passing under the bridle cable ahead, the plane assumes a normal climb.

Although the aerial-track airport is designed to accommodate a number of different types of aircraft, the Piper PA-11 and J-3 models are the first planes to be issued NC certificates for use with the system.

at the station and have the same direction as the direction of movement of propagation.

B. The first gust appears to "trigger" the development of characteristic radar echoes. If a line of echoes is moving toward a station, in most cases the first gust will be from a direction at right angles to the line or in the direction of movement of the line.

C. If an echo or line of echoes is moving away from a station, it is probable that no first gust will occur.

D. First gust forecasts cannot be made when numerous small echoes surround the station, when two or more lines of echoes approach the station from different directions, or when echoes show no apparent movement of propagation.

These observations should certainly give lightplane pilots some knowledge and confidence when flying in the vicinity of thunderstorms. Though radar is not yet installed at most airports, where it is, the information it can impart to lightplane pilots will be invaluable. END.

On a Kite

(*Continued from page 27*)

what he had in store for the rest of his grueling 4,321-mile journey. The only parts of his original machine which reached the coast were the rudder and a couple of braces. Before Rodgers got out of New York State he had crashed his plane in Elmira, Hancock, Salamonca, Red House, Hornell and Canisteo! The magneto plugs wrenched themselves loose on his way to Canisteo, and for 12 miles he held the plugs in place with one hand while managing the plane with the other.

Before the flying machine was finally to reach Pasadena on the West Coast it was to get itself wrecked many times, at least seven of major proportions, and it was to make innumerable forced landings. Longest sustained flight of the entire trip was only 137 miles.

Calbraith's accidents didn't stem from a careless nature. On the contrary, he inspected his plane minutely before every take-off and painstakingly nursed it along mile by mile. But it was hard to get in and out of cowpastures and once the plane got tangled up in barbed wire.

As the flight progressed, the plane began wearing out. Parts would fall apart in mid-air. On one occasion Rodgers had to land and repair a spark plug. And even aviation "enthusiasts" began shaking their heads.

But Calbraith P. Rodgers never gave up, even after a succession of bad smash-ups in Huntington and Hammond, Ind., and Waco and El Paso, Tex.

Another booster who didn't give up was Calbraith's mother, who followed him across the country in a special railroad car, along with extra skids and other airplane parts. The car was furnished by the makers of "Vin-Fiz," a popular soft drink, and it also carried mechanics and newspapermen. To one of the plane's braces, the soft drink makers attached a bottle of "Vin-Fiz," which (they later recounted with pride) "passed through all the accidents without breakage."

After crossing the solitary wastes of the Colorado desert, Rodgers was flying above the Salton Sea in California when the Number One cylinder blew out, completely wrecking the engine and filling his right arm with steel splinters. With one hand on the plane's controls and the other clutching parts of the machinery to prevent the broken engine and propellers from thrashing the fabric to pieces, Rodgers began a series of "gliding loops" that eventually got him to earth safely.

Finally, on the afternoon of November 5, Rodgers brought his flying machine to rest in Tournament Park, Pasadena, Calif. It had taken him 49 days—3 days, 10 hr. 4 min. of actual flying time—to complete the epic flight. It was estimated, all told, that he had completely rebuilt his plane four times along the way.

There is little doubt that Rodgers could have made it somewhat sooner (though not within the 30-day Hearst stipulation) had it not been for some quixotic by-play along the way. When he'd spot a county fair down below, he'd descend and pick up a little change by performing for spectators. Sometimes he'd race express trains along the way. And he flew by the prison in Joliet, Ill., just to give the prisoners a break.

The longest previous flight in the country had been from St. Louis to New York City. Rodgers didn't get a single cent of the prize money however, despite the fact that he was the first man ever to fly coast-to-coast, but he did get bucketsful of glory.

Perhaps this proved his undoing.

Rodgers let it be known that he intended to touch the Pacific Ocean with his plane, just to make the ocean-to-ocean feature seem more official.

He was still tired from the hazardous journey, and he knew the plane's engine was all but shot. But rather than disappoint a large crowd of admirers who had gathered at the Pasadena field, he got in his plane. And for the first time without a careful going-over of the engine, he took off. It crashed on a ranch a short distance away. This time, his flying machine was completely and absolutely demolished. So much so, in fact, that the rugged, seemingly indestructible Calbraith himself was banged up and had to go to bed for several days.

The public continued to clamor more and more for the dashing pioneer aviator. In April, he did a stint of exhibition flying, going over the California coast where he had completed his historic flight half a year before. Again he crashed, this time just offshore.

Again there were hints that the applause that had followed his epochal flight had made him careless in checking his plane. And this time he did not come bouncing out of the wreckage with a wry smile. This time, Calbraith P. Rodgers, the daring young man of the flying machine, was dead. END

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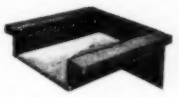

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'The Bite'

(*Continued from page 33*)

planes in flight through the country. But there is one Mexican City that every pilot should avoid like the plague, *TAPACHULA*. The local officials here have stated publicly, "They may be able to do things differently at Matamoras and Tampico, but this is Tapachula and is a law unto itself."

Tapachula is important because it roadblocks the longest, finest, safest and most picturesque private plane airway route that exists in the world—the low altitude route from Canada to Tierra Del Fuego. It is usually referred to as the "Inter-American Lightplane Low-Way."

At Tapachula, the office hours of the three services of Customs, Immigration and Public Health intentionally do not coincide, but even if they did, all non-scheduled airplanes would be forced to pay the complete list of "extraordinary services" no matter when they arrived. That is the latest announcement of the local Chief of Customs, made on June 1st of this year.

No matter when you arrive at Tapachula, you must waste at least one to two hours while a taxi driver is sent to pick up the officials. You will be charged from $20 to $60 for "extraordinary services," according to what officials estimate the traffic will bear. Your plane will not be allowed to proceed until you make the payments. You will also be required to pay taxi fare for the officials to come to the airport, and you will pay five pesos more than the rates normally charged local residents.

Yet Tapachula is neither the beginning nor the end of the *molestacion* and *mordida* ("the bite") which pilots flying south will have to endure from hostile officials.

First, consider the several weeks preceding departure on a private-plane vacation to Central America. If you do have several weeks to plan, you will have time to write or wire the various embassies of these countries in Washington to obtain flight permits. It will take you about three weeks to get flight permits for a trip that will require only 10 to 30 hours of flying time.

The criminal part of this procedure is that the red tape destroys the greatest advantage of the airplane as a vehicle—speed—and relegates it to a pace comparable to the ox-cart.

You will tell each embassy of the various countries where you plan to stop, your name, residence, citizenship, pilot's license and similar information for all your passengers. You must also provide the make, registry number, serial numbers and general information about your plane. Add to this the route, intended stops, approximate dates of your trip, its purpose and any other needless information that may occur to you.

Here is the situation, in the order of countries as you will encounter them on your southbound trip.

MEXICO—The border arrangements are excellent. You will receive an Embassy letter stating that all permits for entering into or crossing Mexico are arranged in a few hours at the United States border, before crossing into Mexico.

GUATEMALA—The Embassy will eventually give you a permit but first must usually cable Guatemala City (at their expense). I have found that when you are pressed for time, it is usually easier to get immediate results by cabling all the above cited information directly to the Minister of Communications in Guatemala City and requesting a cable reply (which is usually pre-paid by Guatemala) to some designated address along the route.

Allow three days for an answer.

EL SALVADOR & NICARAGUA—It appears that these embassies need not cable to their home countries for permission because they reply *pronto*. The Salvador permit usually carries a notation that you cannot carry a camera of any sort while in flight over Salvador but officials within the country say this is incorrect. Once in Salvador, the officials will give you a warm welcome. It is a friendly and lovely country. If you must cable direct for permits, address cables to "Minister of War."

HONDURAS—You will probably receive almost immediately a cable or letter from either the Embassy or the Minister of War at Tegucigalpa advising you to come ahead because they do not require a prior flight permit. Honduras is the best country in Central America for eliminating virtually all requirements.

COSTA RICA—The Embassy will give you a flight permit at once, but they also will probably tell you that all you really need to do is to cable ahead to "*Aviacion Civil, San Jose*" advising of your route, intended arrival and the usual data.

PANAMA—Recent attempts at revolution have caused new restrictions and have ended the complete lack of red tape that formerly existed. Now you must have a previously-secured flight permit, and obtaining it is a slow process. If you wish to request it by cablegram, address "Secretario Aviacion Civil, Ministerio Gobierno Justicia, Panama, R.P." with the usual information. They will undoubtedly send it air mail for you cannot expect them to cable it at their expense. It is impossible to cable collect from most of these countries. The Embassy in Washington will also air mail permits if you allow plenty of time.

CANAL ZONE—Forget about any rights you thought you had as an American citizen when you fly into the Canal Zone. You will be pushed around by your hired-hands there and made to realize your lowly estate as a mere American-citizen-taxpayer even more emphatically than in Washington. *Never land in the Canal Zone without prior permission*, or they will treat you like a spy. You must obtain permission from the Governor of the Canal Zone at Balboa Heights, or through Washington prior to your departure from the United States or your minimum troubles will be $200 in fines.

The new aviation agreement between the United States and Panama, signed two months ago, will absolutely bar any commercial planes, American or otherwise, from landing in Canal Zone airports hereafter, so the lightplane owner can expect to be barred from landing on the Canal Zone military fields (none are civilian). Personal-plane travellers will find facilities and services better adapted to their needs at Paitilla Airport, inside Panama City, but unfortunately a new "*Molestacion* Ruling" does not now permit such personal-plane travellers, even after stopping to check in through customs and immigration at the Border Port of Entry, David, to fly direct to Paitilla. Instead, they must fly 18 miles past Panama city, shoo a couple of airliners out of the way, land at the International Airport of Tocumen, be waved through customs and Immigration there, and spend 30 minutes while already overburdened officials and secretaries write out a formidable set of permits to make the five-minute hop back to Paitilla. After securing signatures of several different officials (give them credit for courteously doing this for you instead of making you dig for yourself as is done in Guatemala) they will present you with a sheaf of papers and a bill for a couple of dollars for landing fees—the only real reason you are required to land at Tocumen instead of Paitilla. You reverse the process in leaving the country. The fact that this clumsy procedure is a nuisance to you (and also to Panamanian officials) has not yet eliminated it.

If, despite all this red tape and correspondence, you have decided to fly to

KING-SIZE

ANOTHER contender for the title of "world's largest pilot" is Steve J. Malina of Del Rio, Tex. Malina, who weighs 365 pounds, couldn't squeeze into the front seat of a J-5 *Cruiser* so he soloed in the back.

He is shown here with a "Doodle Bug" scooter that has been modified to come apart in the center for easy stowing in the baggage compartment—no, he didn't try to ride it.

—W. L. STODDARD

Central America, one of the first type of official papers you will encounter on your flight is the "manifest." For private planes they include on a single sheet, the "manifest" or listing for passengers, crew and baggage, and the route and other pertinent information concerning the plane and the flight.

You will need an ample supply, preferably in Spanish, probably typed up to cover the route for the next several days. Also have an extra two or three dozen personal photos to supply the many officials who are constantly demanding them to put on various types of official papers.

At one time it was possible to travel throughout Central America as a pilot or co-pilot or other member of a crew of a non-scheduled airplane with no passports or other documents except the manifest, together with normal identification papers. Today, most officials consider the manifest as merely one more necessary paper rather than the only one needed.

All passengers in lightplanes normally can be carried on the manifest as crew members. Formerly, an airplane was treated exactly as an ocean ship, and the "Pilot-Commander" of the plane was the same as the ship's Captain and had the same rights under International Law. The crew was, without passports or visas, allowed a certain amount of "shore leave," just as with a ship. Just as crews of liners, yachts or tramp-steamers were given such privileges equally, in all parts of the world, so were crews of airliners and lightplanes treated. In most countries now, alas, petty officials draw a distinction between scheduled airliners and non-scheduled personal planes, and no longer extend these rights to the crew members of the latter.

You will now need a U. S. passport, with visas to the countries you plan to visit, although many of them do not demand visas. You can normally expect to spend half a day securing each visa. You should also provide yourself with a "Good Conduct Certificate" from the police of your native town, and with the usual vaccination certificate, and with a record of any inoculations you have had for disease prevalent in these Central American countries. Inoculation for Yellow Fever happens to be the favorite of the moment in Central America.

At the International Airport at Brownsville, you find there that you must have an "outgoing manifest" from the United States. It must be executed in two sections, and it is of baby-blanket size. The Airport Manager's staff will execute it for you for $3. They will also execute your Mexican papers, such as Public Health Certificate and Flight Permit. They will accompany you to the Mexican officials in order to get your Mexican Tourist Card, which are available at $2.10 per person.

Mexico will not use your passport even if you have one, so don't get a Mexican visa. Mexican officials here are outstanding in their courtesy and helpfulness, with special mention to Tomas Deleon, the Mexican CAA official, who did so much to convince his Government and the various departments that they should place Mexican representatives at Brownsville Airport to encourage private flying into Mexico. It is our own State Department that now steps in and gums the works by stepping in and classifying your private little air-puddle jumper as a "Munition of War" (no less, by crackey!) and requiring you to state where you are going, what current revolution you plan to fight in, and the exact port and date you plan to return to the USA, after some peace-loving Southern neighbor ejects you as a "war monger."

At present it is almost impossible for the private pilot to get out of Brownsville before 9:30 or 10 a.m., even when he has his plane ready for inspection and is ready to hand in his papers at 8 a.m. This is the situation almost everywhere on this route. Pilots find it impossible to get cleared in time to take advantage of the fine flying conditions which prevail in the early morning.

Virtually all the countries you will fly to on your route south require prior-permission to land. This is a useless requirement, since the same information could better be given after you land and without paying for expensive cables or wires which never seem to arrive. It is another example of *molestacion*.

Your first stop out of Brownsville will probably be at Tampico, and there they will merely take the number of your plane, glance at your papers, and notice that you have had your inspection at Brownsville before they wave you on and wish you luck.

The Central American Fliers Association (CAFA) has received a few complaints of high charges at Vera Cruz against planes flying direct from Guatemala enroute north. In at least one flagrant case, Mexico City officials made immediate corrections but I have not yet encountered such difficulties at Vera Cruz. Since clearance officials are not normally kept at Vera Cruz Airport, you will probably have to pay for "extra services" of officials if you arrive late in the afternoon, clearing in from Guatemala, or if you desire to clear out early in the morning, direct to Guatemala, in order to avoid the notorious Tapachula Port of Exit.

At Tuxpan, Minatitlan or Tehuantepec, they will merely take note of your arrival and that ends any formality there. If you do wish to turn in your papers at Vera Cruz or Minatitlan and fly directly out to Guatemala City, you may possibly encounter some difficulty in getting away early in the morning, and some extra expense for officials. This is too bad, because it is best to go through the Pass of Tehuantepec Isthmus in the early morning to avoid the high winds usually met in the afternoon.

You must at all costs avoid Tapachula, the parasitical tollgate on the wonderful American low route. Chiseling and overcharges here have been a fine art for 10 years.

Guatemala is a puzzle, and here is why. It is one of the most beautiful countries in Central America and has developed the glories of its Indian civilizations with the specific objective of attracting tourists. Yet in Guatemala you will receive the most obnoxious treatment it is possible for petty Reception-Officials to visit

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upon entering or departing tourists.

Yet when the traveller has left the Customs, Health and Immigration officials behind and begins to encounter the average Guatemaltecan, he is impressed by their friendliness and courtesy. He retains this better opinion until he prepares to leave. Then he changes his mind again and says goodbye to Guatemala with a sour taste in his mouth.

Some of my finest friends live in Guatemala, yet I believe that the half dozen officials involved in the administration of Aduana, Migracion and Public Health at the airport of La Aurora are the most studied in their contempt for the American traveller that it is possible to encounter. They delight in requiring extra small and annoying permissions or signatures or approvals from persons you don't know how to locate, or insisting that an additional stamp be placed on some document when such stamps are not available immediately.

does not extend to the civil officials of Customs, Health and Immigration, who continue blithely to give Guatemala a black-eye.

The best place to keep your plane is in the care of the Civil Aviation Club on the far side of the field from the Administration Building, but you actually have to get a "special permit" from downtown officials to move it over there once you have landed. The Guatemaltecan officials will seal your plane—and I mean seal it—with obnoxious stickers pasted over the doors and windows that will cost you some paint when you remove them.

When you land in San Salvador, El Salvador, you will note an immediate change. Salvador will accept a manifest for a private plane with all occupants listed as crew members but will probably want corroboration by visaed passports now. Baggage inspection is courteous on arrival and there is none on depar-

MANIFIESTO (MANIFEST)

Fecha: (Date) 29 Marzo 1949

Manifiesto de Tripulacion, Pasajeros y Carga
(Manifest of Crew, Passengers & Cargo)

AVION: (Airplane) NC5209	TIPO: (Type) Piper Clipper PA-16	PESO: (Weight) 825 libs.	NEGISTRADA: (Registry) U.S.A.

TRIPULACION*

PILOTO: (Pilot)	JOHN C.L. ADAME	EDAD: (Age) 47	CASADO O SOLTERO: (Married or Single)	Casado	CIUDADANO DE: (Citizen of) U.S.A.
CO-PILOTO: (Co-Pilot)	ALBERTA E.S. ADAME	43		Casada	U.S.A.
RADIO-TELEGRAFISTA: (Radio-Telegrapher)	PETER ADAME	8		Soltero	U.S.A.
SOBRECARGO: (Supercargo)	ALBERT ADAME	18		Soltero	U.S.A.

PASAJEROS

NOMBRE: (Name)	SEXO: (Sex)	EDAD: (Age)	ESTADO CIVIL: (Marital Status)	CIUDADANIA: (Citizenship)
.....Pasajeros No..... (No passengers)		.....Solamente Tripulacion..... (Only crew)		

CARGA

.....Carga No (No cargo - only personal baggage, personal effects and equipment).....

(Space for Immigration, or other official stamps, etc.)

ITINERARIO (Route)
DE: (From) Brownsville, Tex.
A: (To) Tampico, Mexico
Vera Cruz
Tehuantepec
San Jose, Costa Rica
DESTINO: (Destination) Panama, R.P.

POR EL DELEGADO DE MIGRACION:

FIRMA (Signature) JOHN C.L. ADAME LICENCIA # Com 36066

* For larger planes, you can also list additional passengers as crew members under the titles of Mecanico (Mechanic), Mozozinas (Stewardess), etc.

Simple typewritten manifests, patterned on above sample, will be needed in quantity by persons flying lightplanes through the Central American republics.

They will want you to have at least four or five manifests ready for the use of the various officials when you arrive, and you should also have the same number when you depart. (Remember always to take one copy of the stamped manifest along with you for the use of the officials in the next country to which you fly.)

The Guatemaltecan Airport Customs officials will insist that you leave your plane immediately on landing, with no regard to whether it is safely tied down or hangared. When you get to the Aduana they will stick their noses and fingers into even the smallest boxes of your toilet articles and other possessions. I have yet to see them charge any duty against anyone after such examinations. Their whole attitude is simply charged with suspicion and hostility.

Colonel Arana is one person at Aurora Airport who will do everything in his power to assist a personal plane traveller. He is assigned to duty as Airport Commander but his military control evidently

ture. You will need copies of your manifest for *Migracion*, Customs *(Aduana)* and possibly one for the military. When you are ready to leave, simply load up, taxi to the front of the Administration Building, present your manifests, get one copy stamped for the next country, shake hands and depart. You will feel that they are sorry to see you go.

In Honduras, the honeymoon is still on. They will greet you warmly and seem to be satisfied with only a "crew manifest" and almost any kind of legitimate identification. When you leave, they will accept a manifest from you. Honduras does have on the books a requirement that a traveller must, before leaving, obtain a visa and exit permits from Foreign Relations, the War Department and the Police Department of Investigation. However, although this is enforced by the airlines on their passengers, I have never seen it required of personal plane travellers carried on crew manifests.

Salvador and Honduras are the only countries south of the border which do not collect lightplane landing fees.

Nicaragua, too, is little concerned with baggage inspection and only slightly interested in passports and visas. You can usually stay from one to three days on your Crew-Manifest. No exit permit is required for crew members carried on a manifest. I have never been charged for any extra services for *Aduana* or *Migracion*.

A special note is in order here. You will not be permitted to fly around inside most of these countries, once you have landed, without securing special permission from the military. Mexico, Costa Rica and Panama are the exceptions.

Costa Rica, too, welcomes personal pilots. They state officially that they want an advance cablegram, stating intended time of arrival and the usual information but I have never seen them question any plane that came in with proper credentials for the pilot and with its crew manifest in order. Costa Rica is a remarkably friendly country and no man, woman or child will pass you on a public road without greeting you. Customs and immigration inspections here are a formality.

In Panama you will first land at David. If you do not have a flight permit before landing, you must wait there while the officials phone to Panama City for a permit. When you go on to Panama City you must first land at Tocumen Airport. There, if you desire, they will spend a half hour making you flight papers enabling you to fly the five minute jump to Paitilla Airport, the private plane airport which is only a 10-cent bus ride from town. In leaving Panama you must also fly back to Tocumen. There are no landing charges or fees except at Tocumen.

The types of molestation you will encounter in Central America are many. About one third are deliberate and two thirds due to lack of thinking. Most Central Americans are friendly and courteous, but you will find places where you will be pushed around superciliously. You will find yourself charged for "extraordinary services" which are not extraordinary in any way. You will meet many nuisance requirements such as visas, flight-permits, pre-landing cables, police certificates, entry and exit permits and so on, not to mention numerous obnoxious and unnecessary inspections.

But the most serious *molestacions* are the obstacles put in the way of fast air travel. Government red tape nullifies on the ground the time you save in the air. The requirement for a message of impending arrival, for instance, is perfectly ridiculous since your plane usually will arrive ahead of the message.

The tendency is continuously to add requirements for additional papers, and of refusal to accept the manifest as a single all-sufficient document with all passengers of personal planes listed as crew members. Especially serious is the great amount of time wasted in obtaining visas and flight permits from the embassies of countries concerned.

Perhaps the most serious, because it is the most dangerous, inconvenience of all is the most universal impossibility of get-

ting daybreak starts, or even early morning starts that provide the safest and most pleasant flying conditions in these countries, where flying is usually perfect from daybreak to early afternoon. Including the United States, none of the countries along this route give any consideration to their own tax-paying citizens or free-spending visitors by staggering Duty-Crews so that duly authorized personnel will be on duty from 6 a.m. to 6 p.m. And none of these sovereign countries have ever dared brave the outraged sensibilities of their Sub-Bureau Chiefs by economically and efficiently designating only one man at each airport to represent all of the traditionally and belligerently independent services of customs, immigration, public health and required police, military or administrative services of each country. Such one-man centralization of authority would immediately remove about 90 per cent of the Reception (and exit) Committee troubles now encountered.

These criticisms suggest their own remedies. The dangerous thing is that the harassments and impediments seem to be increasing instead of diminishing. If the trend continues it will eliminate international private flying tours through Central America before they even get going. The solution of all these troubles is too simple and efficient ever to be adopted—even though it would overnight launch a thousand private planes southward and back. What could this be? Merely a joint agreement through the now-existing Organization of American Nations that each would immediately arrange so that any citizen, pilot or plane owner could secure from his local Post Office or similar designated Government Agency a card that would identify him and his plane and contain thereon all pertinent data on both. Once issued, this card would be full authority for flight anywhere within the Western Hemisphere, accepted by all Governments as replacing any and all types of authorizations required heretofore. To take along his family and friends, he puts them down on the Crew or Passenger Manifest, along with his route data, and each traveller carries along his own National Identification card. Simple? Too simple perhaps for the ponderous minds of Statecraft to grasp.

Did I have anything else to add? Oh yes, just a couple of points. First, if you plan to go farther south than Panama, you will *really* get yourself into a mess of red-tape, interminable delays in permit-issuance and degrading police supervision or registration procedures. Lay aside at least one additional month to be wasted in waiting for Flight Permits, visas, etc., in spite of the existing Air Agreements that state that all civilian airplanes of the Western Hemisphere nations have the right of innocent transit through the domains of the signatory nations. Practically all have signed but to date their signatures are no good. Next, our own United States border-crossing techniques stink. Even returning U. S. citizens are given rough treatment, fined, and threatened with plane confiscation if they fail to cable ahead of their impending arrival, even to designated airports of entry and exit. It would take another article like this to list our own nuisance requirements, or practices applied to our own citizens and visitors alike. It may be a toss-up whether *our* border-crossing techniques or our neighbors' are worse—but here's the price of a Planter's Punch that says they will get theirs cleaned up before we do ours. Wanna bet? END

Red Air Force

(*Continued from page* 16)

three-engined and four-engined transports and flying boats. Tupolev designed the ANT-25, the famous trans-polar single-engined monoplane which flew nonstop to the United States in the early 1930's.

Major General Tupolev is also responsible for the PS-40, a small twin-engined military transport, and the PS-41, a transport version of the SB-2 twin-engined light bomber. He designed the SB-1 twin-engined light bomber which saw service in the Spanish Civil War and the SB-2, and SB-3 series. More recently, Tupolev has been identified with the TU-2 attack bomber, now in general service, and possibly a jet-powered version of the bomber. At least one prototype has been shown at Moscow since the war.

The latest reports about Tupolev have been in connection with a transport version of the Boeing B-29 *Superfortress* which has been referred to as the TU-70 (some wag has christened the bomber version the "TU-29.")

Nor have Tupolev's interests been confined to aviation. He has devoted much thought to the air-sledge which is popular in the Soviet Union for both peacetime and military uses. As a youth he built many large-sized kites. He has also been responsible for the design of Soviet PT boats.

It has been reported that Tupolev was imprisoned in 1938, but five years later he was awarded a Stalin Prize, apparently for the TU-2 attack bomber. He has been awarded the Order of Lenin, the Order of the Red Star, Order of Suvorov (2nd Class) and others. At the present time he is engaged in jet warplane research, like so many other top Soviet designers.

Aleksandir Serge'evich Yakovlev represents the younger school of Soviet engineers. He began his intense interest in aeronautics at an early age, first as a model plane builder, and then at the age 20 when he entered the aero-motor section of the Zhukovskii Military Academy (VVA). Within a year he had completed his first design, a single-seat light biplane with an inline engine, called the VVA-3. In 1927 he left the Academy and won the "Round the U.S.S.R." competitions with a lightplane, which he had designed the previous year. He further added to his growing fame by designing a number of lightplanes known as the AIR series.

Shortly after he left the Academy, Yakovlev was appointed a chief designer and appears to have concentrated more

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on military aircraft. Nevertheless, even in the midst of World War II he found time to produce the Yak-6 and Yak-8, twin-engined light military trainer and transport respectively; and the Yak-10, Yak-12, and Yak-14, all single-engined liaison aircraft. Soon after the war he began on his first all-metal civil plane, the Yak-16, a feederline job which is reported to be in service with *AEROFLOT*, the giant national airline.

Yakovlev is a lieutenant-general of the Aviation Engineering Corps, a Hero of Socialist Labor, Doctor of Technical Sciences, Member of the Academy of Sciences of the U.S.S.R., and (a very high position) People's Vice-Commissar for Aircraft Production. For his fighter designs he has been awarded four Stalin Prizes. Yakovlev believes in the small airplane with light wing-loading for maximum maneuverability and slow landing speeds. Over 10,000 of his Yak-1 to Yak-9 single-engined fighters were built during World War II.

Today, Yakovlev is associated with high-speed military designs. At the recent Soviet Aviation day, very fast single-seat jets passed over the heads of the thousands of spectators at Tushino Aerodrome. It has been suggested that a development or developments of the later German DFS8-346 supersonic plane is the parent design of this fighter. This is possible because the Russians captured masses of German documentation when they overran Germany and they have German technicians working with their own men. Whatever Yakovlev achieves in the future, it is pretty certain that he will be one of the top boys for a long time to come.

Another important Soviet designer is Sergei Vladimirovich Il'yushin, born in 1894, the son of a poor peasant in the village of Diliavili in the Vologda District. Il'yushin was an ignorant peasant boy when he started work at an airdrome near Moscow in 1910. When Russia entered World War I, he became an infantryman, but managed to transfer to the Imperial Russian Air Force where he advanced to the rank of mechanic. He entered the Zhukovskii Air Academy and in 1926 was graduated as an engineer.

After graduation Il'yushin appears to have entered Ts.A.G.I., because one of his airplane designs was the Ts.A.G.I.-inspired TsKB-26 prototype bomber of 1936. Some say that this plane was modeled after the Douglas DC-1 and DC-2 of that same period, and the overall design seems to bear a resemblance. This transport was later developed into the DB-3F and the Il-4 of World War II.

Il'yushin is chiefly noted for his famous Il-2 *(Stormovik)*, a single-engined single-seat heavily armored and armed anti-tank and pill box buster. This appeared in service in 1940-41, and was revised as a two-seater and then redesigned as the Il-10 in 1944. It is still in squadron service in large numbers. Today Il'yushin has turned his attentions to transports and jet warplanes. His Il-12 has replaced the many hundreds of DC-3 (PS-84/LI-2) variants on *AEROFLOT* routes and a number have recently been sold to Czech air lines. Of his 66-passenger Il-18 four-engined transport, little has been heard this year.

Artem I. Mikoyan first came to the limelight in 1940 with the advent of the successful MIG-1 single-seat fighter which was thrown into the summer battles of 1941. He is a co-designer with Mikhail I. Gur'evich of the MIG airplanes, but not much has been heard from Gur'evich lately except that he was awarded one of the 10 Stalin Prizes in 1947 for work in connection with jet airplanes. Especially interesting to U. S. pilots is the MIG *Utka* ("Duck"), a three-place canard (tail-first) convertible land-ski high-wing monoplane. The *Utka* has a pusher engine and within a few minutes can be converted into an airsledge by removing the braced wing and installing skis. The MIG-9 is a powerful twin-jet all-metal single-seat fighter now in squadron service. For his jet work, Mikoyan received a Stalin Prize in 1947 with Gur'evich. A revised edition of the MIG-9 was displayed at Tushino Airdrome in 1947.

Other Soviet designers are briefly noted here:

SEMYON A. LAVOCHKIN was born in Smolensk in 1900, and at age 17 ran away to fight with the Red Army. In 1920 he returned to his studies and became an aeronautical engineer. His first publicized design went into production in the 1930's—the LAGG-3, which was still in service in 1940. The initials "LAGG" reveal that at that time he was working in conjunction with two other engineers, Gorbunov and Gudkov. His LA-5 of April, 1943, was capable of dealing with the Fw-190A and went into large scale production, with an all-wood fuselage. Other models followed up to the LA-11, which is reported to be equipped with attachments for mounting ram jet nacelles under each wing. Also reported is a single-seat jet fighter, the LA-15, but it has not been confirmed. In 1947, a number of LA-9's were displayed with various forms of jet units under each wing.

NIKOLAI POLIKARPOV designed the perennial PO-2 biplane, and it was renamed the U-2 on his death in 1944. He designed the early fighters I-15 to I-17, and the recco biplane bomber, the R-5. He was a pupil of the design pioneer Dmitri P. Grigorovich, and at his death was a deputy of the Supreme Soviet.

VLAIDMIR P'ETLYAKOV also died in 1944. He was born in 1891 at Rostov-on-Don, son of a poor family, and became an engineer at 31. He joined Tupolev at Ts.A.G.I. and worked on the TB-7 four-engined heavy bomber, later re-named the PE-8. His major work was with the PB-100 (later renamed the PE-2) twin-engined two-place dive bomber, in service in large numbers by 1941. The PE-3 was developed from this, but it was more of a fighter-bomber, late versions of which were equipped with power-operated gun turrets. Squadrons of this plane are in service with U.S.S.R. satellites.

S. O. SHCHERBAKOV is a glider expert who developed a twin-engined light transport from an original glider design called the ShchE-2 of 1945. It is his only known design, an unusual all-wood powered glider with twin fins used to drop supplies behind the German lines.

P. O. SUKHOI first became known in 1938 when he designed the record-breaking twin-engined transport *Rodina*. He designed the SU-2, a two-seat low-wing monoplane with radial engine of 1941. He was awarded a Stalin Prize in 1947 for "a jet airplane design."

Other Soviet aircraft designers include P. V. TSIBIN, who designed a 24-passenger cargo glider; OLEG K. ANTONOV, probably the top Russian glider designer who has at least 25 designs to his credit, included "a lifting device for tanks;" VLADIMIR K. GRIBOVSKII, a glider designer; BORIS YUR'EV a pioneer helicopter designer and Stalin Prize winner; IVAN P. BRATUKHIN, another helicopter designer and pupil of Yur'ev, and N. I. KAMOV, the third of a trio of helicopter and rotating wing experts.

Three leading aircraft engine designers are V. YA. KLIMOV, ALEKSANDIR ALEKSANDIROVICH MIKULIN, and ARKADI DMITR'EVICH. Mikulin and Dmitr'evich are mentioned under their photographs on page 16. Klimov was responible for developing the Hispano-Suiza 12Y upright Vee 12-cylinder liquid-cooled engine which was built under license in the U.S.S.R. Now known as the VK-100 series, the early engines in this series powered the 1940 fighters MIG-1, MIG-3, LAGG-3 and Yak-1. The latest VK-107 of 1,310 h.p. powers the Yak-3 single-engined fighter. Two other names which have been mentioned in the past three years are A. D. CHAROMSKI and CHELOMEI. Both are believed to be engaged in jet propulsion development.

As in all things Soviet, what can be pieced together about the top designers of the country is fairly sketchy. Latest data is especially hard to come by, but the Soviet designation system, by which planes are identified with their designers, helps in correlating the information. However sketchy the data available, it will be of assistance next time you read some such headline as "YAK-3's BUZZ U.S. TRANSPORTS OVER BERLIN." END

"And There I Was . . ."

FARMER'S FRIEND

One sunny afternoon in 1944 my engine conked out and I made a forced landing in a large wheatfield ready for harvest.

During the struggling take-off the prop thrashed wheat down the entire length of the field. As I banked to return to the airport, I glanced down at the "scene of my crime." There lay the largest wheatfield in Washington's Yakima Valley with a neat path cut through it from one end to the other.

The farmer phoned the airport early the next morning. My instructor apologized profusely and said all damages would be paid.

"Oh, that don't matter none," the farmer broke in, "I wuz just wonderin', with help so hard to git, if you'd send 'er back to finish up the job."

CATHERINE ROWAN

What Does It Cost?

(*Continued from page 37*)

$2.319 per hour for each aircraft.

To this must be added $1.14 per hour for shop overhead maintenance, 16 cents for depreciation on shop equipment, 17 cents for insurance, 54 cents for linemen's salaries, and $1 per hour for depreciation. The total cost thus was $2.319 per hour direct flight costs plus the above charges —or a total of $5.329 per hour.

Here's the way the University figured its costs.

The shop overhead maintenance was computed to be $1.14 per flight hour and was applied uniformly to all planes on the basis of total flight hours of each. The salaries of the aircraft maintenance engineer, the shop foreman, the machinist, the stock room clerk, and the secretary were totaled in the overhead. Also included were the labor and material costs of repairing airplane and engine parts which were then stored in the stock room for future use.

Shop equipment depreciation was figured on a 10-year basis. For the 11-month period this averaged 16 cents a flight hour.

Insurance was unusually low because the University acts as a self-insurer of its own fleet of airplanes except in the case of public liability and property damage coverage. The total expense of repairs to damaged aircraft in the period studied amounted to only eight cents per flight hour.

Linemen are on duty at the University Airport 24 hours a day, seven days a week, to service the University fleet and transient aircraft using the field. In order to have two linemen on duty during the day and one at night, the services of seven are required. The maintenance shop receives the equivalent of one lineman's full time. The remaining six devote about one-third of their time to transient aircraft and two thirds to University aircraft. On this basis, the total lineman's salaries allocated to the study amounted to 54 cents for each flight hour.

The University depreciates its flight equipment on the straight flight hour basis, although there are several other methods. During the period of study, all two-place trainers were depreciated at $1 per flight hour, the Piper *Supercruiser* at $2, the Stinson 150 and the *Seabee* at $3, and the *Kaydets* and *Bonanzas* at $4. (The depreciation rate of the two Beech A-35's recently was raised to $5 per flight hour due to the increase in purchase price and to the installation of additional radio equipment in the planes.)

Costs for fuel and oil represent actual expenditures. The fuel was, in all cases, 80 octane aviation gasoline.

Airplane maintenance costs include expenditures for all labor and material used in the maintenance and repair of individual planes, including accident repairs, major engine overhauls, and rebuilding airframes. Labor costs averaged about $1.31 per hour. The average maintenance cost per flight hour on aircraft of less than 100 h.p. was $1.74.

Unfortunately for the average private owner, the costs outlined in this article are the costs achieved by a first class fleet operation, and the private owner's costs as an individual buying services from a fixed base operator are almost certain to be higher.

In comparing these costs with his own costs, the private owner should bear in mind the following points:

1. The University aircraft are flown annually more than twice the national average number of hours for light aircraft. However, since the University figures its depreciation on an hourly basis, the flight cost is not affected as much as if the University depreciated them on a yearly basis.

2. The method of charging depreciation by the hour may tend to give an unfair idea of costs to the lightplane owner who does not fly his aircraft many hours per year. For example, at $3 per hour, under the Illinois system, the *Seabee* was depreciated a total of only $72 over 10 months because it flew only 24 hours. On the same basis, the airplane would be depreciated only $864 in 10 years—an altogether unlikely figure. On the other hand, the per hour depreciation basis would show higher costs for the heavily used University planes than would actually be the case for the owner who used his plane heavily but depreciated it on a yearly basis.

3. The University is conducting a *fleet*

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operation. Fuel costs are several cents a gallon under ordinary retail prices. Oil is cheaper. Charges for material are 10 to 20 per cent less than ordinary retail prices.

4. The University is not required to make a profit on its operation while the private plane owner is required to deal with operators who must make a profit to stay in business.

5. Standard Illinois fleet operating procedures call for the use of decreased throttle on take-off after breaking ground, as well as a cruising speed about 100 r.p.m. less than that recommended by engine manufacturers. This entails less engine wear, hence less maintenance cost. Relatively little oil is added between complete oil changes, which are made after every 25 hours of flight time.

6. The University personnel operated with instructions to err on the side of safety in 25-, 50-, and 100-hour inspections, and annual inspections. Instructions were to keep the equipment on an "as good as new" basis, and, where possible, beyond the minimums required by the CAR. For this reason, Dr. Bryan believes that the University's airplane maintenance expense is undoubtedly higher than average.

7. Some items, such as hangar rent, are excluded.

8. Insurance costs, under the University's self-insurance plan, are far less than the individual pilot could manage for himself.

9. Dr. Bryan cautions that "no validity for universal application is claimed for the figures. Indeed, the University's own cost figures have changed since the study. Likewise, they may have very little application or usefulness to another operation. Some items which have been included as costs might be questioned, and others, particularly hangar rent, which have been excluded might be included under other conditions and circumstances. Also, the amount of flight time for some of the aircraft on the list is so small that their costs are of questionable statistical value."

10. As a result of the above factors, the costs applied to the individual pilot err on the optimistic side. The private owner can expect his actual costs to be higher than those indicated here for equal services and insurance protection.

Nevertheless, no set of cost figures would apply equally to all pilots. With all their drawbacks, the Illinois costs are probably the best available at present. Private pilots and fixed base operators can use them as a reference point or as a yardstick against their own costs, while making allowances for their special situations. END

Report from Washington

(*Continued from page 42*)

the armed services know that they will be in for real shudders when the President releases the budget for the new fiscal year starting next July. Defense Secretary Johnson has indicated that it will be in the neighborhood of $13,000,000,000. Small wonder that both the Navy and Air Force are keeping anxious eyes on Congress, and are already preparing impressive arguments about how much of a cut they can stand without imperiling national defense.

(There has been talk about reducing the Navy's present force of twelve large carriers to six. It is rumored that when the Navy heard this it put up such a howl that Defense Department budget planners decided it could keep eight large carriers.)

Meanwhile the Armed Services Committee still has a lot of ground to cover in its probe. The next job on its agenda is an evaluation of the B-36 as a weapon. While it has held that there was no skullduggery in placing contracts for the bomber it has not dug very deeply into the controversy about strategic bombing and the ability of this particular plane to make inter-continental flights. Neither has it devoted much attention so far to claims and counter claims regarding the vulnerability of the B-36 to fighter attack at high altitude.

Committee members are understandably reluctant to stage a quiz show that would reveal details of U. S. defense strategy to potential enemies. The hearings, however, have already brought forth some previously secret information about the B-36 and the new medium bomber the Air Force is grooming to work with it—the Boeing B-47 jet bomber.

In their zeal to show that all stakes aren't placed on one plane, Air Force officials proudly gave the Committee a brief sketch of the B-47. They weren't too specific about its range (officially given as "more than 2,000 miles") but they revealed that aerial refueling had proved feasible. They also said the B-47 could carry a 20,000-pound bomb load at a maximum speed of 600 m.p.h. and that it can pack an atom bomb.

It was further disclosed that the B-47 will henceforth be manufactured in Wichita, Kan., instead of at Boeing's Seattle plant (which, defense officials said, was not too good a location because of its "strategic vulnerability"). The B-47, powered by six J-47 turbojet engines, is now in the preliminary stages of mass production.

Some observers take the view that there is scant comfort for the Russians in all this. Even assuming they can pick up much they did not know or could not surmise from the hearings, it is contended they cannot be jubilant about the healthy condition of the American system: there have been no scandals in aircraft procurement, and new and more potent bombers will soon be ready.

Other items on the Committee's agenda call for an investigation of whether the Air Force is too "bomber happy," and a review of the Defense High Command's decision to cancel work on the Navy's supercarrier. Both the Navy and Army will have much to say on these topics if the hearings are not cut short—and so will the Air Force, of course.

FLYING

The Navy's contention is—as it has always been—that its carrier force gives it an important role in bringing the war to the enemy on the land as well as on the sea. It also contends that it is "an instrument by which most of the weapons of the military and Air Force can be expanded into new fields."

In short, the Navy does not want to stick to control of the seas—especially since no other big fleets exist. It does not concede that the Air Force should take over the chief mission of flying the atom bomb. Above all else, it does not want the Air Force to get such a major portion of the defense budget that it has to go on a starvation diet.

The Army view is that the arrangement whereby the Air Force provides it with troop carriers and ground support falls somewhat short of being a perfect solution. A top-ranking general has expressed doubt that an "all purpose" fighter will do the job required by the Army. He does not feel that the fighter that the ground forces need for close support is the same one that the Air Force needs for high-altitude combat or interception.

It all seems to add up to the fact that the Air Force will eventually be faced with the necessity of a dual operation. All developments on the strategic bombing front are pointing in the direction of high altitude fighters—and this means jets for the most part. But the present propeller-driver fighter type will still be needed for tactical operations. To the charge that it is concentrating too much on big bombers, the Air Force has a logical rejoinder. Since the big heavies take so long to develop and build it is just plain horse sense for it to start with them in preparing for an ultimate goal of a well-rounded, 70-group force by 1952. The Air Force can catch up with the quicker-to-build fighters and transports later on. END

Windshields

(*Continued from page* 39)

All plastics used in aircraft windows can be cleaned with soap and water, plain water, or a mixture of water and one of the new "soapless-soaps" which dry without wiping. To reduce surface scratching to a minimum, a chamois or soft cloth should be used to flood dust and grit off before the windshield is wiped. Rubbing strokes should be held to a minimum—in a vertical direction only. Thus, any scratches will be straight up and down the windshield. Crossed or circular scratches create the multiple reflection which hampers pilots' vision.

Don't use solvents or prepared cleaners on plastics unless the cleaner is specifically for use on plastics. Gasoline, acetone, lacquer thinners, benzene, and the like, will attack the plastics used in windshields and cloud or "craze" the surface. Some glass cleaners contain chemicals or abrasives which are harmful to plastics. Safest procedure is to use only specially-prepared plastics cleaners. For best results the cleaner should contain a small amount of wax to polish and protect the surface. In lieu of this, a paste wax may be used to coat the cleaned window.

A final note of caution on cleaning: hot water will cause some plastics to "blush" (in the same manner as dope will blush). Only cold or lukewarm water should be used when cleaning.

Transparent plastics are sensitive to highly localized stresses. Just as woods and metals are likely to crack under stresses, plastics tend to develop a pattern of tiny fissures, a condition called "crazing."

"Crazing" develops when a difference in stresses between the surface and interior of the plastic is sufficient to crack the "skin." In the original state, plastics are given a heat treatment process which serves to remove internal stresses, and consequently the tendency to craze is due to factors introduced during installation, service or maintenance.

Small local stresses may be caused when cutting and fitting plastic for a window enclosure. A formed enclosure also may be free of any sign of crazing yet develop the many tiny fissures after being "cleaned" by a solution which is (or contains) a plastic solvent. The plastic solvent attacks the surface of the plastic and releases some of internal stresses. Since the action is unequal, the crazing condition results.

The tendency toward crazing can be reduced by using approved plastics cleaners. Normal weather and service conditions alone do not usually cause crazing but these conditions *plus* solvent action and improper care may cause a relatively new plastic enclosure to craze.

Differential stresses that cause crazing can also result from negligent servicing and maintenance. Stresses can be created

(*Continued on page* 82)

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(*Continued from page 79*)

by applying undue pressure when cleaning the plastic panel. Pilots or mechanics who tighten enclosure mounting screws may cause the same condition; rough landings also may impose loads upon the airframe, causing stresses to be transmitted and introduced into the plastic.

Mountings for plastic enclosures are deliberately designed to be somewhat loose and flexible to prevent transmission of airframe shock to the enclosure. The plastic panel is generally mounted so rubber or other soft material reduces transfer of shock between metal and plastic. Mounting screws are intentionally loose for the same reason. A good rule to follow in the case of these mounting screws is to tighten the screw and then back it off one full turn.

Sunlight is one of the worst enemies of transparent plastics. Constant exposure to the sun will prematurely age the material and cause discoloration, crazing, loss of flexibility and cracking. If the plane cannot be hangared, a windshield cover is the next best answer. *Do not*, however, cover the plastic tightly with a canvas or other protective cover which rests directly upon the window. These covers retain heat, resulting in blackened glass due to premature heat aging. Arrange the cover to leave a free airspace between cover and windshield.

Small windshield scratches are a constant source of annoyance and distraction, especially on long flights. Small scratches may be worked out by the owner, using a mixture of turpentine and chalk on a soft cloth. Repeated rubbing will remove the scratch, after which the area must be repolished. Use only a soft, dry cloth, preferably wool, for polishing.

Deeper scratches require an abrasive harder than chalk. Machine buffing is recommended only for experienced operators. Heat generated by friction can soften the surface of the plastic sufficiently to cause visual distortion. A number 400 wet-or-dry sandpaper used with a sanding block and worked in a free circular motion over a wide area is a more practical method. Use the paper wet and keep plenty of clean water on the working area to prevent gumming and further scratching. If the sanding is restricted to too small an area a "bull's eye" or area of local distortion will result. Follow the sanding with the turpentine and chalk mixture, finally polishing with a dry cloth.

Small cracks may appear in the best of enclosures because of any number of reasons. Cold weather is extremely hard on plastic enclosures. They become hard and brittle as temperature is reduced. Under such conditions a minor thing such as slamming the cabin door may cause a small crack to develop. This may not be serious in a cabin door panel but steps should be taken to prevent the crack from spreading and elongating. Drilling a small hole ($\frac{1}{16}$ to $\frac{1}{8}$ inch) about $\frac{1}{16}$ of an inch beyond the extreme end of the crack will prevent the crack from continuing.

Reasonable care of plastic enclosures entails little time or labor on the part of the owner. It pays dividends, however, in appearance, re-sale value and, most important, in air safety. END

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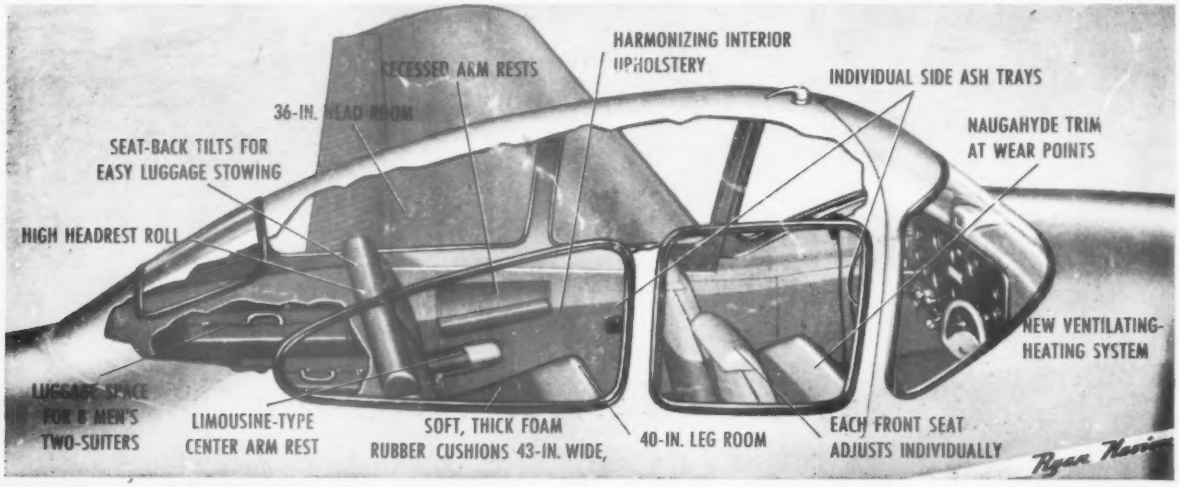
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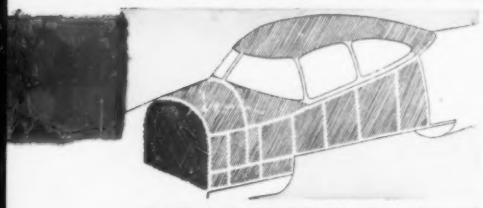

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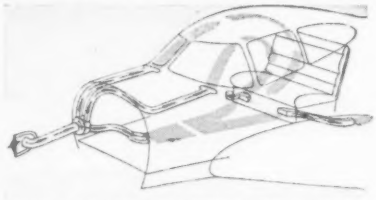

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